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VOLUME XXIII MAY, 1924 NUMBER 5

STUDIES IN THE GEOGRAPHY OF BRAZIL*

W. H. HAAS

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PART V. NORTHEAST BRAZIL

Northeast Brazil was the scene of Portugal's earliest activities in the New World.† Cabral drifted to this coast in 1500 giving Portugal the basis for a claim, and Coelho established the first settlement in the sheltered bay of Bahia in 1503. Portugal, however, had difficulty in holding this long coast line against the activities of the Dutch, French, and English and in 1530 divided the region into "capitanias," each some 150 miles wide and as deep as conditions warranted, and handed them over to wealthy adventurers to colonize, control, and help defend. These subdivisions kept their identity, in the main, and, singly or united, became the basis for the present coastal divisions or states. Here were established the agricultural colonies which gave such a healthy bent to the early growth of the country, for the greatest development has and always will come thru agriculture. The earliest activities were centered around sugar and Brazil wood, but sugar soon became so important that, in the story of sugar, the whole economic life of the period may be read.

SUGAR

The absence of the gold craze in the very early history of the country is quite in contrast with that of Spanish South America. In this Brazil was favored by the excellent natural conditions for the growing

* The earlier parts of this series of articles, together with certain explanation of terms, appeared in the *Journal* for November and December, 1923.

†The geography of Brazil can be understood much better if a few of the leading historical events are known. Good summaries are found in: Pierre Denis, Brazil, Ch. I, (Scribners, 1914); L. E. Elliott, Brazil, Ch. I, (Macmillan, 1917). A map with discussion showing the area occupied by the Dutch from 1630 to 1654 may be found in an article by C. Delgado de Carvalho, The Geography of Brazil in Relation to its Political and Economical Development, *Scot. Geog. Mag.*, Vol. 34, pp. 41-55. For an excellent discussion on the importance of the Papal Bulls see, Ogilvie, International Waterways, pp. 63-73 (Macmillan, 1920).

NOTE: Total length of railroads as stated beneath map, p. 304, November, 1923, should read 28,553,316 meters instead of kilometers. A similar correction should be made in the table on page 317.

of sugar cane, a crop which not only produced rich returns but also gave promise of unusual expansion. An official document as early as 1527 mentions sugar among the articles of export to Portugal, and by 1534 grants of land were made to those who would construct mills to press out their own cane and that of their neighbors. By the time of the first settlements in the United States, Brazil already was the leading source of supply of sugar for Europe. It was on these sugar lands that there was laid the foundation of much of Brazil's wealth, progress, history, and problems.

The early economic history of Brazil is much like that of the West Indies centering around sugar and the manufacture of rum, as there, in the spirit of the times, the natives were pressed into service whether they were fitted for slavery or not. As the Indians on the coast were killed off or escaped, the "bandeirantes" of the south in their pitiless drives rounded them up in the interior and drove whole tribes to the coast and into slavery. The coastal slave trade became a thriving business. With the rapid disappearance of the Indian, the Negro was imported first from the West Indies, later from Africa, and added another strain of blood. With the direct encouragement of the home government, a rapid mixing went on among both slaves and free. The descendants of these make up the bulk of the present populations, for there has been little immigration of European blood into these areas. The region, therefore, is distinct from the rest of Brazil, as already stated, not only for many physical reasons, but also because of the extremely large admixture of Negro blood. This is to be noted especially from Bahia and Pernambuco, the famous old sugar region.

Sugar under slightly different conditions might have become the foundation of a great tropical empire. But the sugar growers have had many problems to meet. There was first the West Indian competition, and later, when gold and diamonds were discovered, there was a rush for the interior taking thousands of slaves away from the sugar lands. The easy escape of the slave into the "Sertão" was another handicap and the freeing of the slaves in 1888 was a most serious blow. After the proclamation they left the "usinas" by the hundreds and drifted to the cities, there to become more or less of a menace to the better classes. In a climate where some sort of a living can be made with a minimum of effort the freed slaves could hardly have been expected to become frugal, hard working citizens with their change of status. The time is still too short to have evolved out of these a high grade citizenry.

The sugar grower has many of the same problems to meet today. The grower first and foremost has to contend with uneconomic altho

low priced labor. All sorts of difficulties arise not only in getting enough cane regularly to supply a high grade mill, but also in getting men intelligent and industrious enough to keep such machinery running. This accounts to a large extent for the primitiveness in growing and handling of the cane and the process of sugar making in much of the industry. The world competition is also keen and the grower under the existing conditions finds it hard to meet the situation. The competition is especially keen in his own country.

As it now is, sugar, as we know it, is limited in its use almost wholly to the larger cities. The rest of Brazil and the poorer classes in the cities use a crude molasses, or hardened cakes of a black brown substance called "rapadura." This is produced by thousands of mills thruout the country and scarcely a "fazenda" exists which does not have its own mill. When prices are high these sugar mills thrive and when prices are low they restrict their output without any distinct loss. Also when prices are high the government has a tendency to limit or prohibit the exportation, as it did again in 1918, in order to keep the price down at home. Under such conditions one can scarcely expect a great industry to develop and thrive.

At present Brazilian sugar is not very important in international trade. It was supplanted by coffee even before the middle of the nineteenth century and since then the industrial development has shifted towards the south. At present there are, however, three important centers of production; northern Pernambuco is the most important, Rio de Janeiro with Campos as a center is another, and São Paulo. Sugar, however, is far more widely produced than the ordinary consumption and exports would imply, for enormous quantities of it are made into "cachaça" or rum.

Brazil, on the whole, is a very heavy sugar consumer. The internal consumption has been estimated at about 800,000 tons a year, or some 80 or 90 pounds per capita. This is accounted for of course by the large amount consumed in the making of rum. Some sweets are imported, while each year also shows some exports of sugar. The exports, however, are relatively insignificant and are by no means a measure of what the country could do. The annual variation is large. In 1913 the export was only 5,260 long tons and in 1914, 31,357 tons. In 1921, a fairly normal year, sugar stood sixth in value of the total exports, with £362,000. During the banner year of high prices, 1919, it stood sixth also with a value of £1,299,000.

Cacao

Another crop which was once so promising but which now holds a minor rank in Brazil is cacao. A native of the American tropics and exported from Bahia as early as 1834 it does not command the position it well might. The crop can be grown thruout this region as well as in the lowland Amazon Basin; but it is more or less limited to southern Bahia, where more than half the Brazilian cacao is produced. As late as 1909 Brazil led the world with a production of about 44,000 tons out of a world total of 205,000 tons. Since then other countries have outstripped Brazil which now produces at its best about 63,000 tons. The industry in Brazil scarcely has increased during the last decade in spite of the enormous world consumption increase.

The following table from Commerce Reports, October 1, 1923, shows the export in recent years and the general areas of production. Bahia at present leads but great possibilities lie along the lower Amazon.

Exports of Cacao from Brazil by Ports (In metric tons)

Ports	1913	1919	1920	1921	1922
Bahia	36,115	54,854	51,577	39,948	41,421
Pará	2,596	5,576	2,611	2,286	3,093
Itacoatiara	——	1,099	23	526	573
Manáos	——	199	56	96	158
Rio de Janeiro	3,145	722	148	12	24
Total	41,863	62,584	54,418	42,882	45,277

Altho the conditions for growth and curing seem to be almost ideal, there are nevertheless serious handicaps. In the main the bulk of the beans is produced under very crude and primitive methods. The quality of the bean when properly fermented and dried is of the best, but due to ignorance and carelessness much of the cacao does not command the price it might with slightly different care. Another handicap is the vicious system of placing export taxes by the various states on commodities as soon as they leave the frontier. In the case of cacao the tax in Bahia is equal to about 20 per cent of its commercial value. Few regions have sufficiently favorable natural conditions so that a fifth of the value of the product can be turned over to the state and yet have it compete successfully in the world market.

Cotton

Cotton can be grown in every state of the union, but at present it is limited largely to this region and to São Paulo. Northeast Brazil,

with an area of about 639,000 square miles is equal, in general, to the area in which our cotton is grown. There are tremendous possibilities in cotton growing and the British government sent over a commission during the past year to study possibilities, which reported that "Brazil can produce if the people of the country desire it, probably all the cotton we require."[1] Our own government reports also that "with proper development Brazil can become one of the leading cotton producing countries of the world."[2] There are in some sections two crops a year and the cotton has an especially good fiber, longer even than sea-island.

FIG. 1. A blue and white tile front in Bahia, a relic of Dutch days. The building is now used as the "Loteria," the home of the state lottery.

In the growing of cotton is, perhaps, Northeast Brazil's greatest hope in developing a high grade land owning middle class. In the main, cotton at the present time is the crop of the small frontier land owner in this part of Brazil. He may have only a fraction of a bale for sale and may find it necessary to carry it horse-or mule-back long distances to market; yet it is definitely his money crop and aids him in the possible accumulation of capital.

The amount that this frontiersman grows is linked up less with the capacity of the region than with transportation. Much of the cotton is grown in the interior not yet reached by the railroads and the ginned cotton must be transported fifty or a hundred miles on pack-mules, ox-carts, or automobile trucks before it reaches a railway station. There are scarcely any highways as we know the term and commodities are transported over unmade trails. The total length in kilometers of so-called highways is, in Piuhuy, 185; Rio Grande do Norte, 148; Pernambuco, 1429; Bahia, 380; Alagoas, 701; and Sergipe, 10.[3] The

[1] *Wileman's Brazilian Review*, Sept. 26, 1923, p. 1274
[2] Com. Report Supplement 9 (1922), p. 9
[3] *Bull. Pan Am. Union*, July, 1923, p. 60

rail transportation is, also, far from satisfactory. In spite of the high freight rates, commodities may lie for months at a station before they are shipped out. When the cotton does reach the coast the lack of high density presses, except in a few of the larger centers, adds to the cost of ocean transportation. Freight, wharfage, lighterage, storage, and packing charges are prohibitive, in most cases, to warrant shipping to the high density presses.

This section, however, has other than transportation problems to solve. The São Paulo section is rapidly becoming its serious rival because of superior methods and better transportation. The São Paulo region also has the added advantage of being industrial and therefore finding a ready market for most of its cotton in its own mills. The advantage, however, is with Northeast Brazil in both soil and climate. The long moist season and the short dry season are almost ideal for the growing and harvesting of the crop. Occasional drouths do affect the crop seriously, and the pink bollworm is a most serious problem in some sections of these states.

It is extremely difficult to make even a fair estimate of the amount of cotton grown in Brazil. There are no official figures and under the conditions grown, even the best estimate may be very wide of the mark. According to the Rio Commercial Club[4] the production in thousands of bales is as follows:

States	1917–18	1918–19	States	1917–18	1918–19
Pernambuco	320	360	Sergipe	30	35
Parahyba	250	240	Bahia	50	60
Rio G. do Norte	150	260	São Paulo	100	235
Ceará	80	200	Minas Geraes	25	30
Maranhao, Piahuy	60	65	Others	25	45
Alagoas	40	40	Total	1,130	1,600

In normal years about two-thirds of the cotton grown is consumed at home by the 1,600,000 or more spindles of the country. The amount used annually has been estimated at about 55,000 tons. As early as 1800, 11,000 tons left for England; in 1860, 22,000 tons; in 1870, 45,000 tons; and in 1874, 78,000 tons. The total export for recent years has been as follows: 1913, 37,423 tons; 1914, 34,433 tons; 1915, 5,223 tons; 1916, 1,071 tons; 1917, 5,941; 1918, 2,594; 1919, 12,153; 1920, 24,696; 1921, 19,600; and in 1922, 33,947 tons.[5] The decrease

[4] Quoted in Dept. of Com. Misc. Ser. 86, p. 32 (1920)

[5] *Wileman's Brazilian Review*, loc. cit.

of export during the war years was due, in the main, to lack of ocean transportation facilities and to greater consumption at home. A recent development is the exportation of cotton textiles to neighboring countries, chiefly Argentina and Uruguay. The value of such export in 1922 amounted to nearly £188,000. Brazil undoubtedly could become one of the great cotton producers of the world.

In spite of the favorable conditions for cotton growing, the high tariff, and the generally adverse rate of exchange, the imports of cotton goods are large. Some of the leading items for 1922 are weaving yarn, 1,004 tons; sewing yarn, 282 tons; mixed cotton, 9 tons; and partly manufactured cotton goods, 4,107 tons. The total of the quantity of cotton goods varies little from year to year, but the value due to various causes, especially exchange, varies greatly. The total importation of cotton cloth has been as follows: 1919, 3,723 tons valued at 53,000 contos; 1920, 2,016 tons, at 98,523 contos; 1921, 2,016 tons, at 55,575 contos; 1922, 3,148 tons, at 75,702 contos. The greatest quantity comes from Great Britain, amounting to 2,408 tons in 1922. The United States which in 1919 sold 1,146 tons representing 16,304 contos, dropped to 282 tons valued at 7,474 contos in 1922. In the importation of cloth, Rio de Janeiro leads. The proportion for 1922 was: Rio de Janeiro 2,289 tons; Santos 570; Pernambuco 106; Bahia 53; and Porto Alegre fifth with 28 tons.

VEGETABLE OIL[6]

Much of the region is well adapted to the production of vegetable oils; and this infant industry seems to have an uncommonly bright future. Accurate data on the production or even estimates upon the potentialities are unobtainable. The wide variety of raw material used is shown in the following table appearing in the *Diario de Pernambuco*, April 26, 1922.

NUMBER OF VEGETABLE OIL MILLS

Raw Materials	Brazil	Cons. Dist.[7]	Raw Materials	Brazil	Cons. Dist.
Cotton seed	39	10	Ucuhyba	4	0
Castor seed	20	7	Ouricury	3	0
Babassú nuts	14	2	Linseed	3	0
Coconuts	8	1	Patana	2	0
Peanuts	4	0	Total	101	20
			Counted twice	33	4
Sesame	4	0	Actual number	68	16

[6] Much of the data is taken from an excellent, but unpublished Consular Report by G. R. Cameron of Pernambuco, and loaned by courtesy of the State Department.

[7] Pernambuco consular district takes in the states of Pernambuco, Alagoas, Parahyba, and Rio Grande do Norte.

Cotton seed oil heads the list with Pernambuco and São Paulo as chief centers of production. The maximum annual production is about 13,200 metric tons of oil. The average production, however, is much less, altho the amount easily might be much more. Some of the seed, estimated at 50,000 tons for 1921, is shipped out of the country untreated, mostly to England, and large quantities in the frontier sections are not used at all. It is estimated that only about 36 per cent of the seed is consumed by the mills due almost wholly to deficient transportation. Cotton worth 11 to 17 cents per pound will bear the expense of transportation as described, but cotton seed worth three-fourths to one and one-eighth cents per pound cannot be transported profitably under the conditions. The cotton seed oil industry is capable of tremendous expansion.

CASTOR SEED OIL

The production of castor oil is the second most important vegetable oil industry. The size of the industry is fairly proportional to the demand for oil; and since the oil as a lubricant stands up exceptionally well under very high temperatures, the demand may be expected to increase rapidly. It is used also as a medicine, as an illuminant, and in manufacturing processes, especially in soap stocks. Little oil is at present exported from Brazil, the total amount being only about 617 tons annually.

Conditions seem to be especially favorable for the development of this industry. The plants of some species grow unusually large, twenty to thirty feet high, and the seeds also are very large. However, the smaller varieties are preferred because the seeds are richer giving as much as 55 per cent of their weight in oil. The production of seeds may be as high as 5,000 kilos per hectare with a relatively small outlay. It has been estimated that with proper equipment this part of Brazil could produce enough lubricating oil to displace the high priced petroleum lubricants thruout South America.

THE BABASSÚ

Babassú oil is new to most people but it is almost sure to become more widely known during the next decade. The oil is of very high grade and is much like that of olive oil in not becoming rancid with age. The nut is a product of a palm which grows wild in all the states of Northeast Brazil, but in extraordinary profusion in Maranhão and Piahuy. Because of its abundance the nut became prominent during the war as a fuel, being superior in weight to wood, and about two-

thirds the value of high grade coal. The tree is a prolific bearer producing nuts up to four inches in major diameter, in a cluster which may have as many as 1000 nuts. The annual crop in Maranhão alone is estimated at 15,000 tons of kernels, less than one-third of which is utilized.

The excellence of the oil and the cheapness of an abundant supply would seem to insure success to the industry. The problems are to harvest the crop in a country of sparse population and to transport it to the refineries. The nut is also incased in a hard shell difficult to crack without breaking the kernels also. Nearly all the nuts are

FIG. 2. A group of dwellings facing the main "praça" or park in Maranhão. The balcony is such an essential part of the home that a place must be found for it.

broken by hand as there is at present no satisfactory nut-cracking machine. As the nuts yield only about 10 per cent of their weight in kernels it is evident that the harvesting will also include the removal of the kernel from the shell. As the kernel gives about 60 per cent of its weight in oil, and as the oil cake is a valuable food it may be shipped fully as profitably as copra. The industry is still in its infancy for only 58 tons of oil were exported in 1920, and 80 tons in 1921. The exportation of Piassava and Babassú nuts together in 1919 was 11,000 metric tons, and for 1920 only about 7,000 tons.

THE COCONUT

Northeast Brazil is especially favored for the growing of the coconut. The long, sandy, windward coast offers almost ideal con-

ditions not only for growth but also for ease in transportation. The industry, however, is still in its infancy altho there are many large groves with a total of at least 3,000,000 trees. The major centers are about Cabadello in Parahyba and around Maceió in Alagoas, altho from Parahyba in the north to Bahia on the south is a great coconut zone. The possibilities of expansion seem almost unlimited.

The industry at present seems in a very chaotic condition. Production evidently has outgrown marketing possibilities, perhaps only abilities. As at Cabadello, coconuts seemed to be everywhere but no place to go. The Brazilian Department of Agriculture estimate that the crop for 1921–22 was over 10,000,000 coconuts for Pernambuco;

FIG. 3. Cabadello coconut palms and thatched roofs. Few places in Brazil have an aspect so tropical. Cabadello is one of the centers of the coconut industry.

about 16,000,000 for Alagoas; and for both Parahyba and Rio Grande do Notre about the same as for Alagoas. In view of this large production, the number of coconuts or the amount of copra exported is almost negligible, altho there is a considerable coastal trade. The waste is tremendous for immense numbers are used solely for their water. Large numbers are sold in restaurants as a beverage. The scientific handling of the crop, the utilization of the coir and shell, and the proper preparation and grading of the copra should make the Brazilian coconut a world factor.

OTHER PRODUCTS

The products enumerated in the preceding pages by no means complete the list. Tobacco, widely grown, and in places where care is exercised in the handling of the crop, is of a high grade. Bahia is the manufacturing center of a thriving cigar and cigaret industry. Manioc, beans, and meats make up the bulk of the food for the people thruout Brazil. The average Brazilian would not wish to live without his "farinha." Some coffee is shipped out of Bahia, but is, for the most part, of low grade. Bahia also has some of Brazil's best manganese deposits and has also some excellent diamond deposits. The tungsten bearing ores of this region are some of the best in the world.

FIG. 4. A drive along the sea in Bahia—the hills, the sea, the tropical vegetation make most of the east coast of Brazil very attractive. Note the absence of a coastal plain.

A study of the possibilities of this region cannot help but impress one greatly. This is more or less true of other sections as well, but especially so here. The question, naturally, comes—Is the lack of up to date development due to unfavorable geographic conditions, or to other causes? Remotely and indirectly, to some extent, to geographic conditions, no doubt. Yet, geographic conditions on the whole, outside of natural transportation routes, are not unfavorable. What this section needs is capital, and men who know how to make money effective. Geographic forces have not been allowed to play their rôle. An editorial[8] on Mexico is applicable to this region. "The creation of a new constitution and the negotiations of new treaties will not solve their problems. The erection of school houses, the building of public highways, the introduction of modern methods of agriculture, the development of natural resources, the adoption of modern sanitation

[8] *World's Work*, Nov., 1923

and hygiene—these are the real tasks ahead." When these things are on the way of accomplishment in Brazil, geographic forces will be found aiding and not hindering.

THE DROUTHS[9]

Northeast Brazil, great in its potentialities, has a most serious water problem to solve. The rainfall is most erratic both in amount and in distribution. The extended periods of drouth cause the most terrific suffering, and may be sufficiently severe to cause whole districts to become depopulated and revert for the time being into desert wastes. During these periods of drouth the inhabitants of the "ser-

FIG. 5. A more or less typical view of the undeveloped but better part of the "sertão" toward the latter part of the dry season. Many of the trees are only half bare of leaves. Such a region makes good pasturage during the wet season, and if not grazed too closely also during the dry season.

tão"[10] remaining until the last hope disappears, migrate either to the "serras" or to the coast, usually the latter as the former areas soon are overpopulated. Only a few of the people who survive the resulting famines, the epidemics, the looting and banditry, the treking to the coast, and the hardships of refugee camps have the courage to return.

[9] For further study read: H. H. Smith, Brazil, the Amazons and the Coast, Ch. XIII, Scribners, 1879 (second hand stores only); Pierre Denis, Brazil, Chs. 14 and 15 (best book on Brazil); C. M. Delgado de Carvalho, Météorologie du Brésil, especially pp. 225-235; I. W. McConnell, *Bull. Pan American Union*, Jan., 1923, pp. 16-30 (very informing); Mark Jefferson, New Rainfall Maps of Brazil, *Geog. Rev.*, Jan., 1924, pp. 127-135.

[10] The word "Sertão" is used by the people along the more rainy coast to designate the dry region of the interior. In the dry interior "Sertão" refers more specifically to the dry sandy plains in contradistinction to the higher, greener tablelands, the "Serras."

Some of them do return, however; others, attracted by the offers from the Amazon states, of free transportation, land of their own, and other inducements, cast their lot in a region wholly unlike their own and for a life to which they are unfitted; while others still continue to be objects of charity or add to the slum population of the coastal cities. With better rainfall conditions, the rich "patrão," a sort of feudal lord, dwelling in one of the coastal cities, again stocks his land with cattle and workers, and aside from the monetary loss has not passed thru any particular hardships.

The drouth region is large, covering fully one-tenth of the entire area of Brazil, and in places is fairly well populated. The "sertão" extends from the southern boundary of the equatorial forest, which is near the coast in the northeast, well into Minas Geraes. On the east

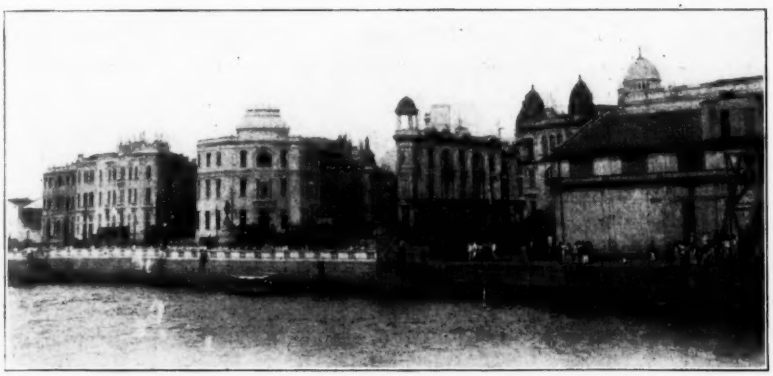


FIG. 6. Recife along the waterfront. The whole appearance of the business district is that of a well-built, prosperous city.

it begins back of the Serra do Mar, the coast range, and extends far within Matto Grosso. Thruout this vast region there are various conditions of rainfall and lack of rainfall; but the region most subject to drouths, at least causing the greatest hardships, extends from the middle section of the São Francisco River and north. This includes parts of Ceará, Rio Grande do Norte, Parahyba, and, to a lesser degree, parts of Piahuy, Pernambuco, Alagoas, Sergipe, and Bahia. Ceará, the state most thickly populated in the drouth region, naturally suffers most; and the conditions there may be and usually are taken as fairly typical of the much larger area.

The region is a part of the Brazilian Plateau. It is for the most part a high rolling plain with isolated hills and ridges extending above the general level, and with narrow valleys cut below. The topography of much of it is very like that of New England or the southern Pied-

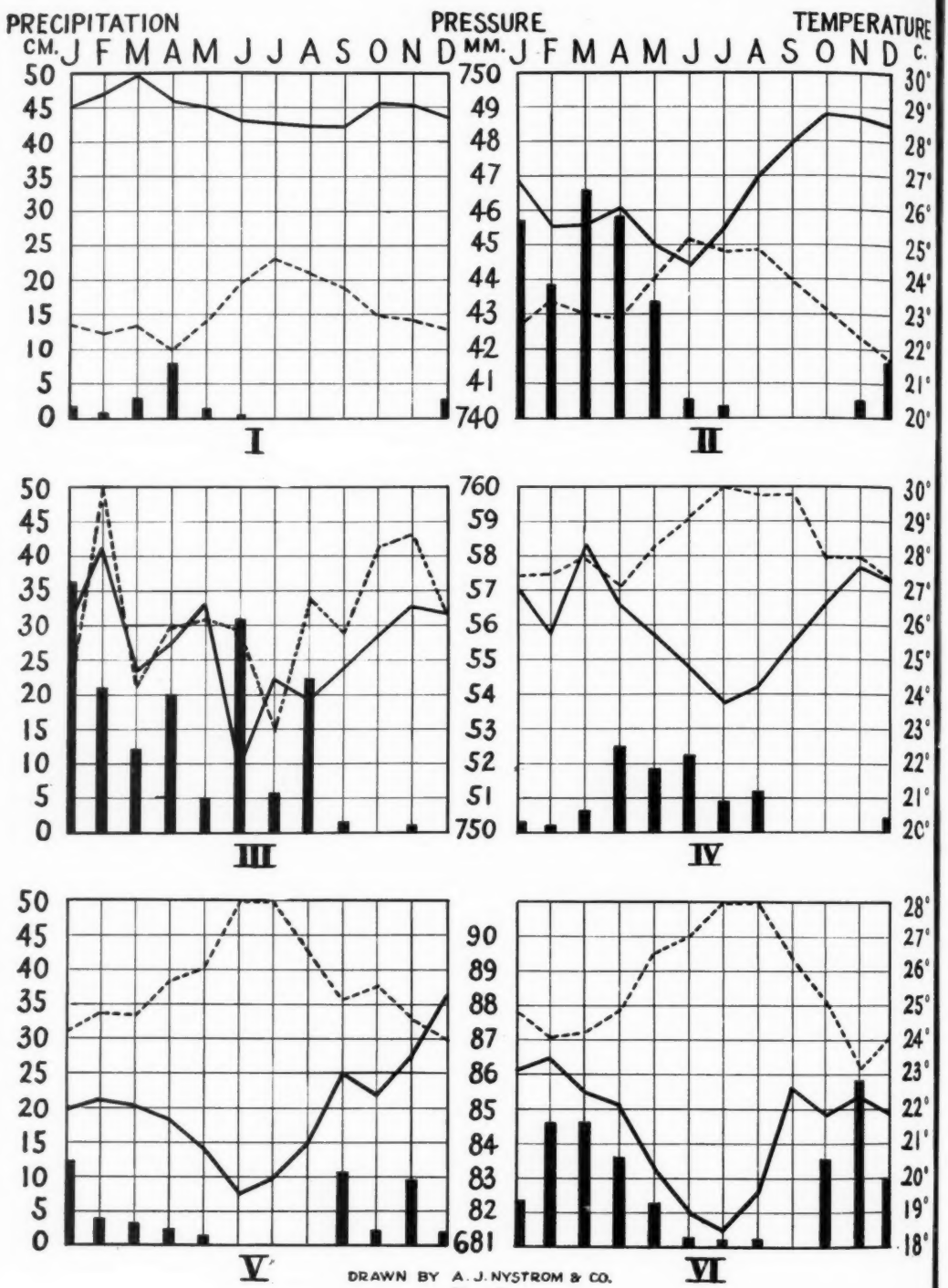
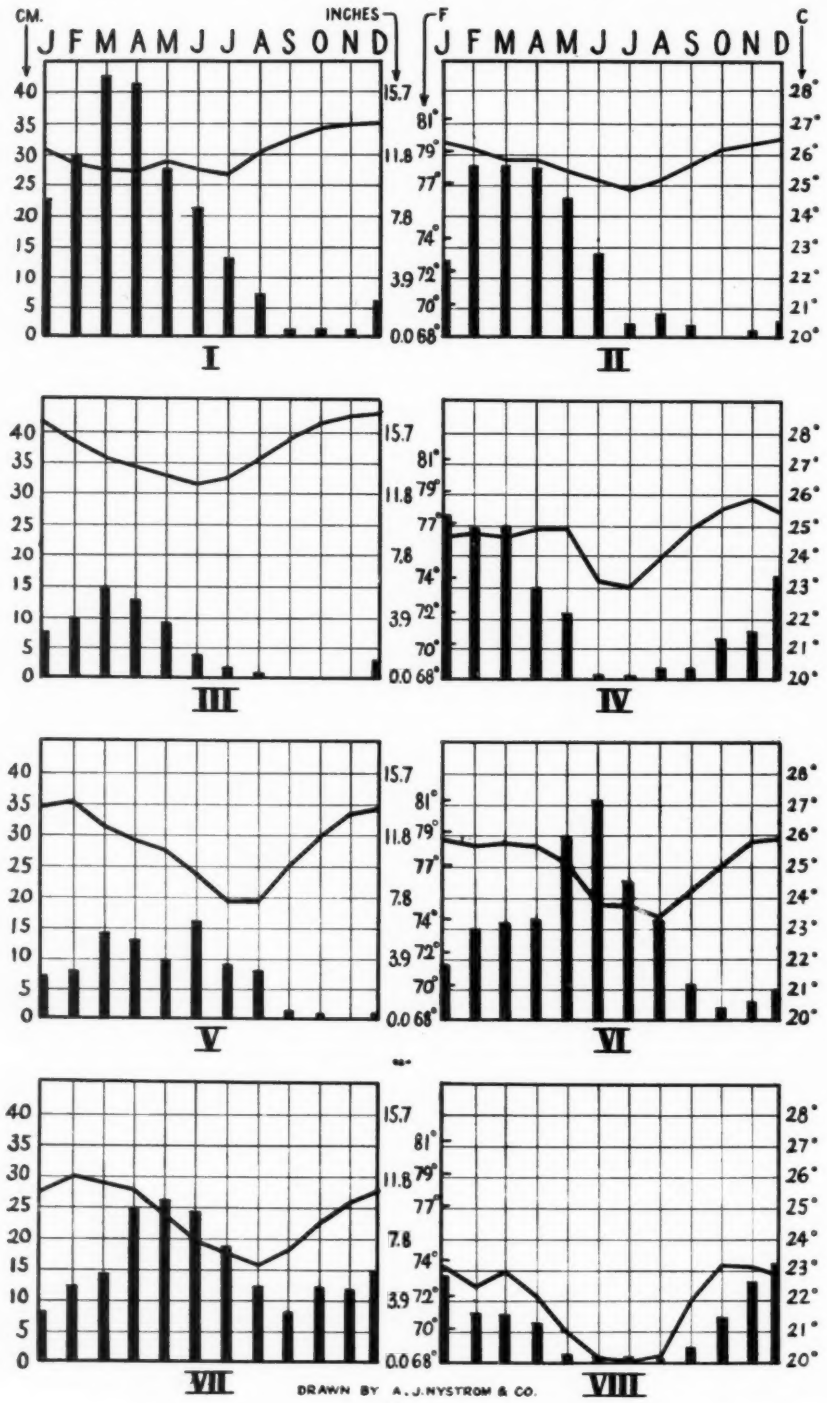

PRECIPITATION
CM.
J F M A M J J A S O N D
50 45 40 35 30 25 20 15 10 5 0
I
PRESSURE
MM.
J F M A M J J A S O N D
750 49 48 47 46 45 44 43 42 41 740
II
TEMPERATURE
C.
30° 29° 28° 27° 26° 25° 24° 23° 22° 21° 20°
50 45 40 35 30 25 20 15 10 5 0
760 59 58 57 56 55 54 53 52 51 750
III
30° 29° 28° 27° 26° 25° 24° 23° 22° 21° 20°
IV
50 45 40 35 30 25 20 15 10 5 0
90 89 88 87 86 85 84 83 82 681
V
28° 27° 26° 25° 24° 23° 22° 21° 20° 19° 18°
VI
DRAWN BY A. J. NYSTROM & CO.

FIG. 7

FIG. 7

Station	Year	Precipitation		Mean Temp.		Mean Pressure in mm.
		cm.	inches	C.	F.	
I. Quixeramobim	1915	20.9	8.3	29.0°	84.2°	743.2
II. Quixeramobim	1917	145.1	57.1	26.7°	80.0°	743.5
III. Nova Cruz	1914	155.1	61.1	25.4°	77.7°	761.8
IV. Nova Cruz	1915	49.3	19.1	26.0°	78.8°	758.4
V. Caetité	1911	45.0	17.7	22.0°	71.6°	688.7
VI. Caetité	1916	114.1	44.9	21.5°	70.7°	688.6

In the grafs presented the vertical lines represent the monthly rainfall, the continuous horizontal line the mean monthly temperature, and the dash horizontal line the mean monthly pressure. For legibility's sake the base line for temperature begins at 20° C. for I, II, III and IV, and at 18° C. for V and VI. The base line for the barometric pressure is 740 mm. for I and II; 750 mm. for III and IV; and 681 for V and VI. Note the higher temperatures for the drouth years than for the more humid years; also note that the drouth years do not have a barometric pressure very different from that of other years. Dry years, therefore, are not to be explained on the basis that the interior low does not materialize.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DRAWN BY A. J. NYSTROM & CO.

FIG. 8

FIG. 8

Station	S. L.	W. L.	Alt. m.	Precipitation		Mean Temp. C.	Record in years
				mm.	inches		
I. Tury-Assú, Maranhão	1° 43′	45° 26′	15	2158	85.0	26.0°	8
II. Porangaba, Ceará	3° 46′	38° 32′	27	1477	58.3	25.8°	8
III. Quixeramobim, Ceará	5° 16′	39° 15′	207	657	26.0	27.5°	24
IV. Imperatriz, Maranhão	5° 31′	47° 34′	95	1410	55.5	24.6°	7
V. Nova Cruz, R. G. do Norte	6° 25′	35° 27′	78	882	34.6	25.7°	7
VI. Parahyba, Parahyba	7° 06′	34° 56′	30	1763	69.3	25.0°	8
VII. Ondina, Bahia	13° 00′	38° 30′	47	1876	74.0	24.8°	11
VIII. Caetité, Bahia	14° 02′	42° 35′	900	787	31.3	22.0°	11

In the grafs presented the vertical lines represent the mean monthly rainfall, and the horizontal line the mean monthly temperature. Note that in order to have the temperature scale large enough to make the seasonal variations noticeable the base line is not represented by 0° but by 68° F., or 20° C., the temperature usually given as delimiting the tropics. At the places represented the seasonal variation of temperature is rather uniform, with a tendency to greater extremes as the higher latitudes are reached. The distribution of the rainfall into a wet and into a dry season is very marked, except stations VI and VII, on the east coast.

mont; however, with steeper slopes as would be natural where no frost action occurs and with terrific rains for a part of the year and none for the rest. There are parts, however, really mountainous in character, such as southeastern Piahuy, giving the nickname of "Brazilian Switzerland" to that state. The elevations divide the region into distinct belts. (1) The "Littoral" or low, rainy coastal belt; (2) the "Serras," the hills and ridges sufficiently high for forest growth; and (3) the "Sertão," a semi-arid region with parts covered by a thin forest or shrub growths and with parts open pasture or sandy tracts.

There are many degrees of drouths in the "Sertão." A glance at the grafs (See Fig. 7) shows that the year is divided fairly sharply into a wet and into a dry season. The dry season is always dry and the wet season may be more or less dry also, the severity of the drouth varying with the scarcity of rainfall during the wet season. (See Fig. 8.) During the very severe "Seccas" little or no rain may fall during several consecutive years. During the great drouth of 1723 no rain is said to have fallen for a period of five years; and during the one of 1877–1879, probably the most serious of all because of the greater density of population, almost no rain fell during three consecutive wet seasons.

The life of the region clearly reflects the conditions. The dry season is from June or July to October or November, and during this period trees shed their leaves, birds migrate to the serras, and the ungrazed grass is allowed to dry on the stalk to furnish pasturage until the spring rains. As the season advances temporary but elaborate wells are dug in the dry stream courses. The crop is harvested and stored without fear of rain; and toward the end of the dry season the crops are again started to take advantage of the first rains.

The coming of the rains is always a matter of solicitude. Showers may start in October and if they do there is much rejoicing. If, however, month after month the rains fail to come, the hopes for a prosperous year gradually turn into despair. If the rains start in January or February some of the crops sown in the dry season still may mature; but if no rains fall by the feast day of São José, March 19, then all hope is given up and a long dreary wait or worse is ahead until the rains of the next season. During such drouths, thousands of head of cattle, already thin and weakened during the scanty pasturage period of the usual dry season, succumb. When the rains of the second and third rainy period fail, then even the last water holes dry up and a long march of unequalled hardships over a hot, dusty, sunbaked land is the only thing that can save even those of the greatest endurance.

There seems to be no well defined reasons why these drouths should occur.[11] The rainfall of the region is, of course, closely associated with the migration of the low pressure area which supposedly centers during the wet season over and north of the middle Tocantins Basin. The region still is known so little, meteorologically, that conclusions drawn seem worthless. In general, when under the influence of the southeast trades, the region back of the Serra do Mar is dry; but the "low" seems to be just as strong during the dry rainy-season as during the wet rainy-season. (See Fig. 8.) It is the dry rainy-season that brings the serious consequences and not the dry dry-season. During the dry rainy-season the "serras" or higher parts get more rains and become during moderately dry periods a haven of refuge. There is a tendency also to use the higher lands for crops and the lower lands for pasture.

These drouths will always remain more or less a serious handicap to the region. There are already in the various states many relatively small water storage reservoirs for town use as well as for irrigation.[12] The national government is building now some very large dams in Ceará to alleviate conditions. The problem, however, is greater than the mere building of reservoirs. The whole annual run off comes in six months or less. The slopes are steep and there is little or no natural storage of ground water, or lakes, or swamps to act as feeders during the dry season. The stream gradients are high, the run off rapid, and the streams, raging torrents in the rainy season, carrying enormous quantities of sediment, become dry sandy beds almost as soon as the rains stop. The natives take advantage of the heavy, silt laden run-off and build catch basins for the silt to settle. When the water evaporates or part is let out of these "açudes" large areas of rich alluvium are exposed, usually with sufficient moisture to produce good crops without further rains. It is believed locally by many that in these "açudes" will rest the future of enormous areas where irrigation is needed but impossible.

The uncertainty of the rainy season is the problem. The stored water cannot be used both for irrigation and for emergency when a wet season fails to materialize. No computations can be made for there never can be any certainty as to the amount to be reserved from one season to another. To build storage dams large enough to be the sole supply without replenishment for eighteen or thirty or even more

[11] Carvalho, loc. cit., pp. 232-5, quotes various opinions and concludes that the rainfall is cut off by the surrounding mountains. W. G. Kendrew, The Climates of the Continents (1923), p. 328, sees no explanations for the erratic rainfall distribution.

[12] See McConnell, loc. cit., map opp. p. 16.

months perhaps, seems wild and unreasonable. Probably, no artificial storage conditions anywhere are sufficiently favorable or lands rich enough to warrant such an outlay. The region is large and the population is already fairly dense, as shown in the table following. The building of dams may increase rather than decrease the effects of a very extended drouth.

AREA AND POPULATION BY STATES*

States	Area Sq. Mi.	Population		Density 1920	Capital and Population 1920	
		1919	1920			
Maranhão	178	459	853	4.8	São Luiz	60
Piahuy	117	334	548	4.7	Therezina	46
Ceará	40	849	1,436	35.9	Fortaleza	60
R. G. do Norte	22	274	552	25.2	Natal	30
Parahyba	29	491	873	27.0	Parahyba	25
Pernambuco	50	1,178	1,954	39.1	Pernambuco	250
Alagoas	23	649	990	43.	Maceió	40
Sergipe	15	356	535	35.7	Aracajú	50
Bahia	165	2,118	3,373	26.4	Bahia	825
Totals	639	6,728	10,925			88

*Area and population in thousands as given in Dept. of Com. Misc. Ser., 86 and 89.

The region has tremendous possibilities but these probably will not be realized even in part for a great many years to come. The lack of transportation facilities by rail is the greatest handicap. The few railways with their inferior transportation facilities are inadequate even in the region which they serve. The lack of public highways for motors is striking. There can be little hope for the development of a region where all the produce must be carried by pack-mule, or creaking ox-cart with a dozen or more oxen necessary to carry a load, which one horse could pull over a macadam road. The poor rail service and the unusually high freight charge make competition between the interior and the outside world in any commodity almost impossible.

TEA IN ASSAM, INDIA

CLARENCE F. JONES

Clark University

INDIA IN WORLD'S TEA PRODUCTION AND TRADE

India during the last five years has produced an average of 366,000,000 pounds of tea. China probably produced as much or more, but statistics of production are not available. The population of India consumes little tea while that of China uses much. During the same period there was exported from India an average of 336,000,000 pounds or 45 per cent of the world's exports of tea or an average of 73,000,000 pounds more than both Ceylon and China, the second and the third tea exporters.

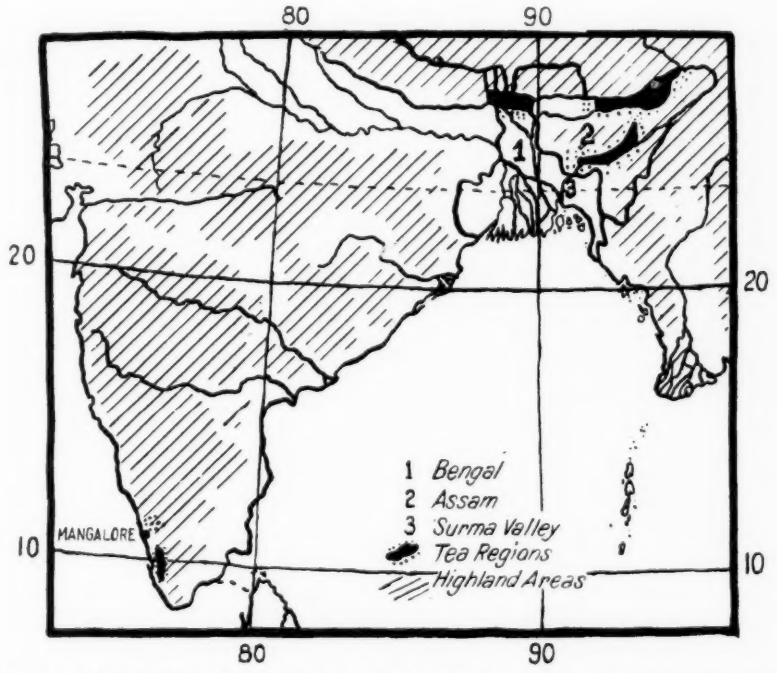

FIG. 1. A sketch map showing the tea producing areas of India. In 1913 the tea areas of the Surma and Brahmaputra valleys produced 91 per cent of all the tea of India.

This significant position of India in the tea trade of the world is a comparatively recent development. The tea industry in India is less than eighty years old. The suggestion to attempt the cultivation of tea in India was made in 1788. The first authentic public sale of Indian tea occurred on May 26, 1841 in Calcutta. In 1834 a committee was appointed to study the tea industry of China and the tea plant of

Assam. It decided that the more promising areas for the establishment of tea plantations were, the Assam Hills, Southern Himalayas, and the Nilgiri Hills in southern India. Experimental tea plantations were established between 1834 and 1849 by the Indian government on the Assam Hills, but were not successful till after 1851. By 1865 all these plantations had been leased to private companies.

The growth of the industry has been very rapid. The acreage increased from no land in tea in 1838 to 188,000 acres in 1877, and 704,000 acres in 1920-21, while the exports increased from 36,000,000 pounds in 1877 to ten times that in 1919. India's tea exports have increased from one per cent of the world's tea exports in 1860 to 52 per cent in 1921. Between 1660 and 1850 China was the only tea exporter and in 1864 it exported 97 per cent of the world's exports, but only 8.6 per cent in 1921. China's large market for tea has been captured by India.

What physical environmental conditions in India have favored the extension of the tea industry and how has India become the world's largest exporter of tea?

TEA AREAS IN INDIA

Of the three areas, the Assam Hills, southern Himalayas, Nilgiri Hills, chosen in 1834 by the committee on tea as the more promising areas for the establishment of tea plantations, none lead in production today. In 1917-18 there were 667,100 acres in tea in India. In the Brahmaputra and Surma valleys in Assam there were 399,700 acres and 167,800 acres in the Brahmaputra valley in Bengal. These two valleys had in that year 88 per cent of all the tea acreage of India (Fig. 1). The yield per acre (500–1000 pounds) is twice as great in these valleys as in the other tea districts of the country. In 1913 they produced 91 per cent of all the Indian tea.

ENVIRONMENTAL CONDITIONS AND TEA PRODUCTION

The preceding facts indicate that conditions in the Brahmaputra and Surma valleys are favorable for a large production of tea. The tea bush for large yield requires high temperature, high humidity, and a large amount of rainfall during the leaf forming period. The climatic conditions in the center of the tea area of the Surma Valley are especially favorable. The mean monthly temperatures are above 72° F. for all months of the year except December, January and February. The relative humidity is more than 70 per cent for the entire year and more than 80 per cent from May to October inclusive. The annual rainfall at Silchar (Fig. 2) is about 120 inches. There is a

spring rainfall of 37 inches, and a heavy monsoon rainfall of 75 inches from June to Spetember inclusive.

An examination of the climatic conditions at Sibsigar (Fig. 3) and Dhubri (Fig. 4)—two stations in different parts of the Brahmaputra Valley tea area—show conditions similar to those at Silchar—that is: an annual rainfall of about 100 inches; a moderate spring rainfall; heavy monsoon rainfall—June to September inclusive; a high relative humidity and high temperature thruout the year. These conditions are not found over any extensive area of India. A typical monsoon rainfall is illustrated by the rainfall of Mongalore on the west coast (Fig. 5). Precipitation during the spring months is light and there is a long dry season even tho this place gets as much rain per year as Silchar.

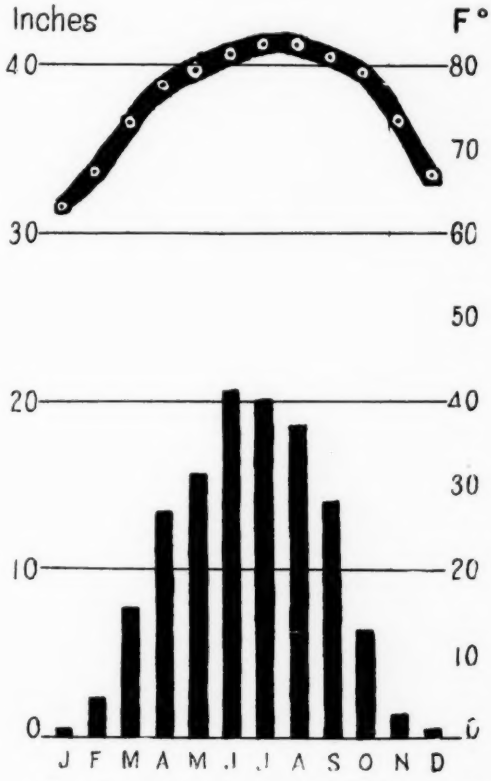

FIG. 2. A climatic chart of Silchar, Surma Valley, India. The heavy rainfall during the spring months allows the tea plant to get an early start thereby influencing greatly the yield of the bush.[1]

Because of the heavy rainfall each month, from March to October inclusive, in Assam, tea can be picked more frequently during a greater part of the year than in any other part of India and any other country of the world, with the exception of Ceylon. It is picked every seven to ten days or twenty-five to thirty times during the season. In South China tea is picked three times during the summer.

The age at which the tea plant can be picked first and the length of the periods between prunings are affected greatly by the amount of rainfall and temperature conditions. The long, hot, humid summers of Assam are particularly favorable for the propagation of the plants.

[1] J. Hann. Handbuch der Klimatologie, Vol. 2, p. 219, (Stuttgart, 1908)
Geography: Physical and Political of the Province of Assam, Shillong, Assam. 1896

In Assam special plants are set aside for seed purposes where the bushes are allowed to grow into small trees and produce seed. The seed is sown in nursery beds. When about six months old, the seedlings are removed and planted four to five feet apart in lines at right angles on the tea plantations. These in Assam average from three hundred to four hundred acres each. When one year old, the bush is cut to within six to eight inches of the ground; at the age of three years, fourteen to eighteen inches. Then each year there are light prunings until the plant is twelve years old when it is again cut to within twelve to fifteen inches of the ground. This process is repeated until the plants are about thirty years old.

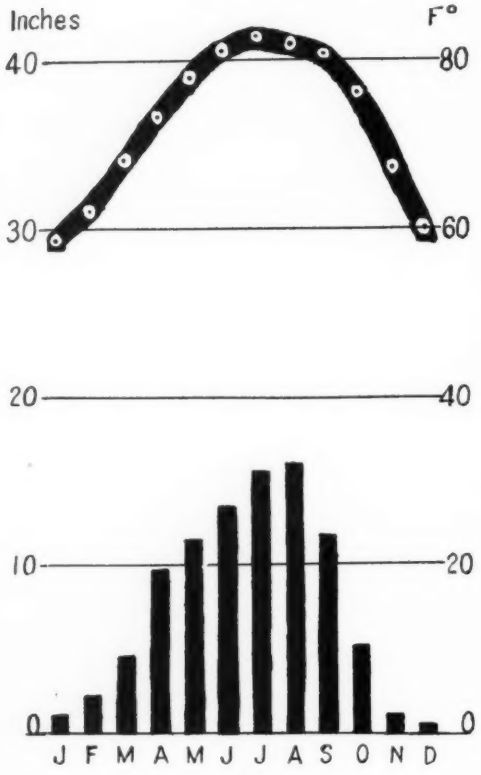

FIG. 3. A climatic chart of Sibsigar, Brahmaputra Valley, India. The long, hot, humid growing season is especially favorable for a large production of high quality tea leaves.[2]

The plants yield a small crop in the second year; in the third, if the rainfall is normal, the yield is about one hundred fifty pounds of tea per acre. By the seventh year the bushes are full bearing, yielding from five hundred to one thousand pounds of tea per acre.

The tea plant is grown on a wide range of soils and topography, but the yield of the bush and the quality of the leaf are affected greatly by soil conditions. Two types of soils especially are poor for tea; a clay which cakes or hardens in the sun, and a very loose sand over gravel. Such soils produce a stunted bush yielding little leaf. The soils giving the best returns in quantity and quality of leaf are the deep sandy loams with a large amount of organic matter, about eight-tenths per cent nitrogen, and a loose subsoil which gives good drainage and

[2] J. Hann. Handbuch der Klimatologie, Vol. 2, pp. 206, 218, (Stuttgart, 1908)

allows free penetration and full development of the tap root and root system.

In Assam virgin forest land on the valley bottoms is preferred to hill soils. These favorable soils cover large areas in the Surma and Brahmaputra valleys. Upon the advice of the Indian Tea Committee, the first tea plantations were established on the hills, because the theory was, that tea grew best on elevated situations, and that the slopes of the low hills especially were suitable. But the Assam Hills have been abandoned for the low flat lands of the valleys for two reasons. (Fig. 1.) In the first place, the problem of soil erosion and drainage is of importance. The removal of the forest from the upper slopes permits the erosion of the soil at so rapid a rate that the tea must be grown on terraces. Even then the heavy rainfall causes serious landslides. Moreover, the soil of the plantations is turned up to a depth of four inches at intervals of six weeks thruout the growing season and to the depth of eight inches after the last crop is picked. Keeping the ground in a loose condition and uncovered in a region of so heavy rainfall as this permits great leaching of the soils. In the second place, the soils of the valleys have greater fertility originally and are more easily managed than the hill soils. Proper drainage is produced by artificial means.

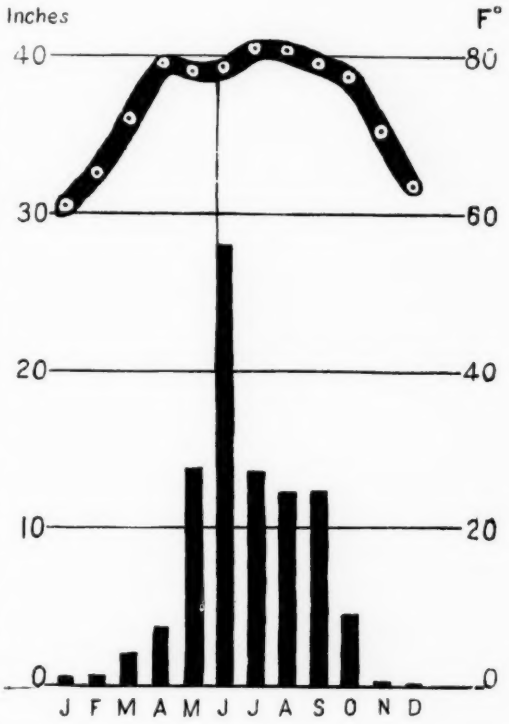

FIG. 4. A climatic chart of Dhubri, Brahmaputra Valley, India[3]

In addition to the above advantages which the Assam Valleys have there is a population in the valleys of about one hundred persons per square mile. This gives a sufficient supply of labor. But there has been a great deal of difficulty in teaching the natives the proper

[3] J. Hann. Handbuch der Klimatologie, Vol. 2, p. 206
Geography: Physical and Political of the Province of Assam, Shillong, Assam. 1896

method of picking the tea leaves in order not to destroy the buds and in having them be careful in performing each of the different processes involved. Because of these difficulties with labor and the variable grades of tea that were produced from good leaves, machines, which have been developed since 1870, perform each of the processes of manufacture. Now most of the tea in India is machine manufactured but the picking is all done by hand.

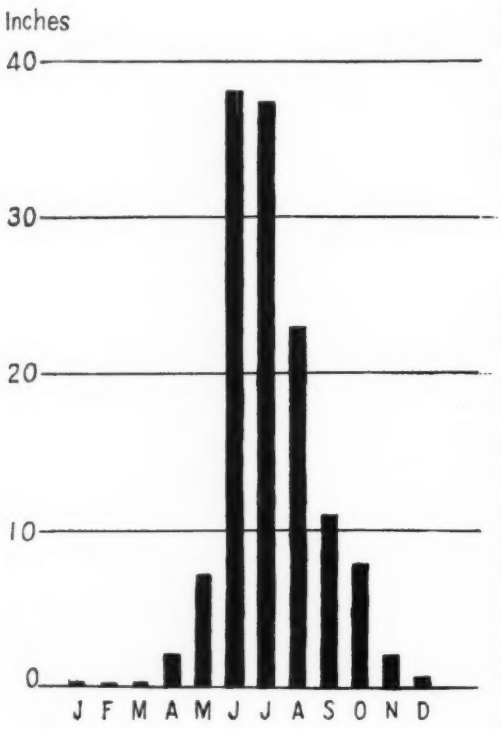

FIG. 5. A climatic chart in Mangalore, India[4]

SIGNIFICANCE OF INDIA AS A TEA EXPORTER

India is not only a great producer but the world's largest exporter of tea. China, while producing a large crop, is by far the largest consumer. India consumes little. The latter has for a long time imported a small amount of green tea for consumption. In 1912 the total amount of tea consumed in India was 22,000,000 pounds including both imported and Indian teas, and in 1915 the amount was 25,000,000 pounds. India in 1917 exported 97.5 per cent of all the tea produced. India has gotten China's largest market, the United Kingdom which is the greatest tea consumer in the world, (except China and possibly Japan) consuming twice as much as Russia and three times as much as the United States, the second and third tea importing countries. In 1860, 85 per cent of the imports of tea into the United Kingdom came from China and 3 per cent from India and Ceylon. In 1890, 30 per cent came from China and 70 per cent from India and Ceylon, while in 1913, 3 per cent came from China and 56 per cent and $33\frac{1}{3}$ per cent from India and Ceylon, respectively. Moreover, the Chinese exports have actually declined. In 1885 they were 283,000,000 pounds, but decreased to one-fifth of that in 1921.

[4] J. Hann. Handbuch der Klimatologie, Vol. 2, p. 219, (Stuttgart, 1908)

This decline has been due to three main causes: the change in the British public taste, in regard to teas, the Indian teas being preferred; the inefficiency of the Chinese methods of cultivation and manufacture as contrasted to Indian methods; and the lack of extensive advertisement.

One reason why the British tea taste has changed is, that the people of Assam have changed it for them, by the teas produced and by advertising. A brand of Assam tea is of uniform grade. On the other hand it is hard to get a large consignment of Chinese tea of uniform quality, because in China tea is produced in small patches for home consumption and only the surplus from each family is collected for export. Tea is the only money crop of Assam and the people have made efforts to get a market for it. The advertising business began as a voluntary levy on the planters, with a government contribution, for the purpose of advertising Indian tea at the Chicago Exposition in 1893. The levy was continued on a free basis till 1903 when a Tax Cess Act was passed making compulsory a small tax on exported teas. It has been in force up to date, being renewed every five years. The continuance of the tax is evidence of its commerical value. The money is expended on all forms of advertisement in the United Kingdom, United States, and Russia which have increased greatly their imports of Indian teas.

In some ways the tea industry of Assam has bright prospects. Assam has about 10,500,000 acres of cultivable land, which is not now being cultivated, that is suitable in all physical environmental characteristics for the profitable production of tea. If the market for Indian teas could be increased, it seems that there would be a greater production in Assam. The two great tea importing countries, (other than the United Kingdom) the United States and Russia have increased rapidly in their imports of Indian teas. During the fiscal year 1906-7 the United States imported Indian tea to the value of £40,000 Sterling and two and one-fourth times as much in 1914, while Russia in 1904-5 imported £220,000 worth of tea and in 1914 five times that amount. It is probable that these two countries will import more and more Indian tea.

While a great advertising scheme has been carried out in foreign countries, little has been done to increase home consumption of tea in India. If the Indian people should develop the tea drinking habit, there certainly would be a large market there for the Assam teas. India's consumption of tea increased from 15,810,000 pounds in 1910 to twice that amount in 1918.

Nearly all the tea produced in India is black tea, but there seems to be no reason why India cannot produce as good a green tea as China or Japan. Both kinds of tea are produced from the same bush and the same quality of leaves. The only difference between them is that in the manufacture of black tea the process of fermentation of tannin is allowed to proceed further than in green tea. In 1909 the production of green tea in India was 2,678,000 pounds and in 1911 two times that amount.

If India can produce green tea on a basis to compete with China and Japan, as all conditions seem to indicate that it can, it may be able to replace those countries in the Russian, American, and Australian tea markets which would mean a large future export.

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A STORY OF INDIA

A REVIEW OF GEOGRAPHIC RELATIONSHIPS

BERNICE MEYERS
Public Schools, Somerset, Pa.

"For ten days and eleven nights I have been on my knees. For nights and nights I have not slept. I've watched and prayed for rain for days and days; but still no rain has fallen," said Harun to his family of eight.

Already the season of rain in southern India had been delayed for almost a month. No one could understand the reason. Families were starving; scant vegetation of the farms was burning up; and river beds were full of crevices.

Before this long period of drought Harun and his family had lived very comfortably. Their crops on their large farm had yielded a plenty and for five winter months food was in abundance.

What was this poor family to do for food? And many other families, too? Even tho crops could not be planted for so long, and hundreds were starving, we wonder why they did not kill some of the cattle of which India has more than any other country in the world. Surely, if we were so near starvation in our land and we had plenty of cattle to provide food for all, we would eat them as food. But in India, you remember, all cows are held sacred and it is considered a crime to kill or abuse one there.

Soon Harun learned of some way of rescuing his family and himself from the ensuing starvation. One day a tall, friendly foreigner came to the little Indian home which was fast falling into decay. He saw the children lying around on the burning hot sands begging for food. He was from England, they finally learned, and had come to help them as well as others.

Next day Harun and his children found themselves partially revived and Harun found employment with this man. In return, he was given substantial food for his labor. He helped to build large wells, which he learned would hold excess rain when the monsoon rains should come. This was the way in which England meant to develop the land of India as well as to help the sufferers from starvation.

For almost a week he worked and tugged away. The large elephants which they used to drag away the dirt were also weak from hunger. The donkeys which hauled the lumber no longer had the energy they once had.

One morning, late in July, the thing for which millions had been watching had come. It required several days for the rain to soak up the soil so that it could be tilled. Finally, Harun and some of his largest sons took their bullocks which they hitched to rude wooden plows and began to plow the soil.

Their dried, parched, bare, brown skins were now eased. Baked by the burning sun, they had become an awful thing of torture. Only a scant bit of clothing did they wear about the waist.

Caliph, a son of Harun, was a boy about fourteen years old. He never knew what cold weather was. In his land, he lived "out-of-doors" the year round. His home was made of sundried bricks and clay reenforced with poles of bamboo. Palm leaves formed the scant roof.

One morning, very early, when the rain had ceased but for a short time, Harun and Caliph set out for the fields which were several miles distant. They arose thus early because the sun, in India, becomes so hot late in the day that the Hindus there can scarcely work, so they take advantage of the coolness of the morning.

After cultivating the soil, in one section where the water had been dammed up, Caliph's father directed him to set out some tiny rice plants. While he was planting the rice he had a terrible mishap. He was out in the very center of the flooded field and while stooping over, several hundred of his tiny, tender rice plants accidentally fell from his bamboo basket and sank to the bottom of the rice bed. Really, it was quite laughable to see Caliph make a leap under the muddy water for his precious plants. Little did he care about getting wet, for the hot sun would soon dry his brown skin. You remember, his clothing was very scant. While Caliph was planting the rice, his father was planting some cotton plants.

While the men were out in the fields the mother of the family and some of the younger children were busy planting vegetable seeds as cucumbers, peas, beans and other greens.

Weeks of hard rains continued and the crops grew very fast. Soon came the harvesting season when the entire family was occupied for weeks. Caliph was assigned to pick the white fluffy balls of cotton and the fields of tea. Jute bags were used thru the fields and when they were full he emptied their contents into large bamboo baskets. Most of the time he had help from the younger members of the family.

The highest grade of Indian tea was raised on Caliph's farm. There was great demand for their tea and all of the surrounding factories were always anxious to receive the tea that came from this farm, for it was picked so clean and the leaves were handled so carefully.

The father and some poor Hindus, who worked for but a few cents a day, harvested the rice. The mother prepared flour from the rice by pounding the grains which were freed from the heads of grain by having donkeys tramp over the sheaves. She made the flour by pounding the grains with a stone hammer upon a large, flat stone.

Five years passed. Harun and his family of boys, who were stalwart young men now, had worked very hard. The monsoon rains had been ever faithful during these years. They were now to be rewarded for their untiring labor—every one of them. Their crops, which they could now produce the year around had made the family rather wealthy.

For years the head of the family had heard of wealthy people going to the mountains to spend the hot summer months. He decided to go and take his family with him. But whom should he get to take the responsibility of harvesting his crops? He hired five Hindu laborers who worked for a petty sum each day.

Just before the opening of the hottest season this Hindu family packed up their belongings, which were more numerous than they had

been accustomed to in their home land. Each one provided himself with a heavy outfit of clothing, for they heard that in a short time they would be in a cold land.

In two days after their departure they found themselves in Darjeeling, a city of northern India and a lovely, healthful, summer resort. From here they could see the beautiful snow-capped peaks, and they enjoyed so much the view of Mt. Everest, less than one hundred miles away. For several weeks Harun noticed that his sons had been absent from their home a great deal. He thought, of course, that they spent their leisure time in the city; but after investigation he learned that they had been spending their hours just a few miles out of the city watching the caravans pass thru the "Pass" which connected China and India. This pass was just a short distance north of Darjeeling.

Caliph was anxious to know what these caravans carried; so one day he succeeded in persuading one of the captains of the train to stop. He asked him what he had in the large jute bags on the backs of his camels. The caravan man informed him that among his articles were tea, opium, wool, silk, hides, and cotton. After learning this Harun decided to spend a bit of time also watching the caravans pass thru this "Pass." "How interesting!" he thought. "I have learned something new!" How each one enjoyed the cool, delightful mountain air, which they had never felt before!

Two months of this pleasurable vacation for the family had passed and they then were ready to return home. All were greatly pleased with their trip and they were well, refreshed, and vigorous for another season's work on the farm. All the family decided that they should work much harder during the coming year and then spend a short vacation in the Himalayas again.

HUMAN ADJUSTMENTS

1. Failure of monsoon rains to come to southern India
2. Irrigation wells to store excess rain
3. Elephants used to drag away ground
4. Donkeys used to haul lumber
5. Plowing with bullocks
6. Scant clothing due to intense heat
7. Live out of doors the year around due to climatic conditions
8. Homes of sundried bricks and clay
9. Bamboo poles used in homes
10. Roofs made of native palm leaves
11. People rise early and go to work due to intense heat
12. Planting of rice in flooded field
13. Bamboo basket used to carry rice plants
14. Planting of cotton plants

15. Planting vegetable seeds in the family garden
16. Picking cotton and putting it into jute bags (two responses)
17. Raising of tea on the family farm
18. Threshing native rice by having donkeys trample over it
19. Making rice flour between stones
20. Trip to mountains
    1. Heavier outfits of clothing due to change in climate
    2. Caravans thru "Pass"
        1. Tea
        2. Opium
        3. Wool
        4. Cotton
        5. Hides
        6. Silk

A CONTEST IN LOCATIONAL GEOGRAPHY

WINIFRED D. BRODERICK
Louisville Normal School
Louisville, Kentucky

The use of a map to locate places connected with the reports or discussions in our classrooms has become a real part of the day's work. During supervised study periods, children use their maps carefully and satisfactorily. However, I have wondered, frequently, whether this use of maps was carried outside the school. Do the children refer to a map when they read a newspaper or book? Are the places seen in the "current news" at the picture shows located on a map later? We as teachers know that these habits of work are hard to check. Nevertheless, I believe that the "map using habit" carries over more frequently than we think.

NEED FELT BY CHILDREN

Early in this term, some of the children in our seventh and eighth grades came to ask for more place geography. Often, they came at the close of school to borrow an atlas. They wanted to locate places they had heard discussed outside of school. Several said that a greater knowledge of places in the United States would be very helpful. They felt that a clearer picture of a place mentioned would be obtained when a person knew the actual location of it. They knew that there were irrigation projects in the west. But, if a project in Utah were discussed, they wanted to be sure they knew the location of Utah. When reading of the plans of the Inland Waterways Commission in the newspaper, could they locate the rivers mentioned? These seemed to be needs which we should meet.

What was to be done to solve this problem? The seventh grade children were studying South America and Africa. Time had to be spent on the necessary locational geography required for the study. And, yet, there was a need for the locational geography of the United States.

CLASSES SOLVE PROBLEM

The problem was put to the classes. They decided that weekly contests might help. During this time, the children felt that they would like to become better acquainted with the locational geography of their own country. Later, they could work on the locational geography of other countries. Some of the types of places we decided to work out were: the more important cities, the states, and the rivers which were of real value to irrigation or transportation. We had to limit our lists to those places whose importance we could prove. Each week, with my help, a list was compiled. Then, time was spent before school and at home to get these places located accurately. Groups gathered at the wall maps in the mornings before school. There was a tangible acquaintance made with wall and textbook maps. At various times during the week, I gave five or ten minutes of a class period for some simple games which helped to check on the work. One of these games was "Geography Baseball" which I shall explain later. In these games, various types and sizes of maps were used.

CHECKING RESULTS

At the end of each week, we checked our results in a ten or fifteen minute written test. In these tests, several methods of working were followed. Sometimes, an outline blackboard wall map was used. Numbers were put on it. The children identified these numbers on their papers. At other times, the children were given individual outline maps upon which they were to mark places assigned on the board. Inter-class rivalry was stimulated, to a great extent, by a chart we have reproduced here. A class flag (Fig. 1) was put on the summit when each child in that class made an average of ninety per-

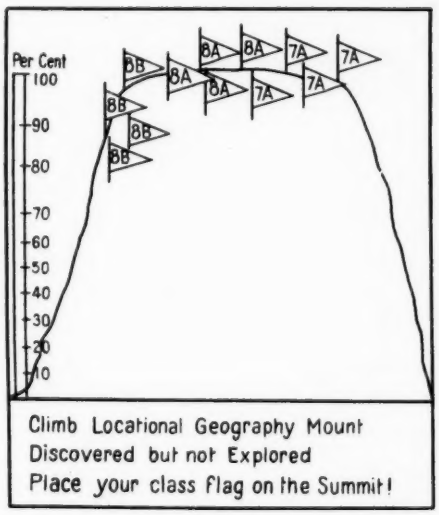


FIG. 1

cent or better. The percentage of each class was figured and the flag placed at the proper place on the hill. The interest in the work was great. Our regular work in geography continued as usual. But the children were anxious to have the checking up time. The contest lasted five weeks. The children are asking for more of the same type of work.

GEOGRAPHY BASEBALL

Our Friday morning assemblies are actual pieces of work which the children have carried out in their classes. Seven-A challenged Eight-B to a game of "Geography Baseball" for one of these assemblies. I am going to let the children tell you what they did.

An Eight-A girl announced the program.

Whenever our geography teacher announces that we are to have a game, we begin to get ready for a good time. One of the games we like best is "Geography Baseball" and that is what we are going to play this morning. Seven-A has challenged Eight-B to a game. Two of the boys from Eight-A will umpire and keep score. Another boy will tell you how we play the game.

With the help of the chart reproduced below, Layson Swann explained the game.

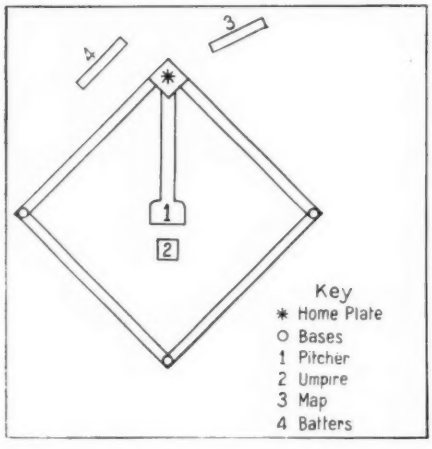


FIG. 2. Field for "Locational Geography Baseball"

This chart shows a diagram of a baseball field (Fig. 2). The diamond has been marked off on this stage. The team at bat stands here. The pitcher, who is from the opposing team, gives out the name of a river, mountain, city or lake. The batter must identify it and point to it on the outline map placed back of home plate. If he is correct, the umpire says "First Base" and the player advances. When a player fails either to locate or identify a place, he is called "out." Then, the next batter comes to bat. When three outs are made by a team, the other team comes to the plate. A run is scored when a player touches each base in turn and returns to home plate. A man may not advance a base unless the man at bat is told to move to first base. We have ten minutes to play. If the first team at bat makes no outs by the end of the first five minutes, the other team will be allowed to come to bat.

At the end of the ten minutes, the score was announced and the winning team presented with a small "Geography Pennant."

VALUE OF CONTEST

What was the value of this five weeks contest? The children and I felt that we could see definite results. There had been a real interest in the work. Maps had been used—really touched. There had been

a spirit of helpfulness among the children in a class. The slow people had been helped by the more rapid workers. Groups had gathered at the wall maps and worked together. There were few people who made a grade of less than eighty percent in the weekly tests. No one had to be urged to work. The interclass contest helped to check upon individual as well as class effort. Maps were being used at home. Much of this study was individual effort. And, finally, we felt that we had met our own need. Of course, this contest checked only the locational phase of our geography. There were other means used to check upon the big units of work which we carried out in the individual classes. "Human Geography" was not neglected. The need for locational geography had arisen. We tried to meet it. We felt that the contest served its purpose.

THE FISHING INDUSTRY AT BOSTON

FREDERICK K. BRANOM

Chicago Normal College

GROWTH OF THE FISH TRADE AT BOSTON

The fishing industry has been important at Boston from the time of its first settlement. During the colonial era fish were taken in large quantities from Boston to Europe, the West Indies and the colonies to the South. The forests of New England furnished the timber from which the fishing vessels and the ships of commerce usually were constructed. As the trade of the Boston merchants increased with the outside world, many fishermen brought their catch to the port because it furnished a good market.

The fishermen took an active part in the colonial wars. In the war with the French they helped to take Louisburg, the stronghold of the French fisheries in Canada. During the Revolutionary War many privateers were outfitted by fishermen. Naturally the fishing industry suffered during the War of Independence.

After the Revolutionary War Boston slowly resumed its importance as a fishing port. Being the greatest commercial center of New England, it became a resort for fishermen and a market for the sale of fish of all kinds and of fish products. Altho Boston was never an important whaling port, yet many whaling ships received supplies from its merchants and likewise large amounts of sperm oil and whale bone were disposed of thru these same sources. Gloucester surpassed Boston as the leading fishing port of the United States until a few years ago.

Both ports have excellent locations on the Atlantic coast. Boston became the foremost fishing port chiefly on account of its better transportation facilities, its more extensive facilities for handling fish and its accessibility to larger markets.

About 1837 fish were brought alive to Boston by some of the fishing vessels. A number of the vessels had water-tight compartments amidship, and holes were bored thru the bottom thus allowing ocean water to circulate thru the compartments. At the wharf the fish were killed, dressed, packed in ice and shipped. A few years later, vessels began to carry ice with them. At first cooling rooms were used on the boats, but later crushed ice was mixed with the fish. During the last fifty years, the practice of carrying ice in vessels which bring in fresh fish has developed marvelously. Today, ice is carried by vessels engaged in securing such fish as fresh mackerel, cod, halibut, and blue-fish. The fish are iced carefully with the crushed ice so as to avoid injury.

IMPORTANCE OF THE FISHING INDUSTRY

New England produces annually about half a billion pounds of fish valued at approximately $20,000,000. This is about one-fifth of the total weight of fish caught in the United States and a little more than one-fourth of its total value. Boston receives approximately one-fourth of the catch of New England. The following table shows the species of fish brought to Boston in 1920 with the quantity and value.

FISH PRODUCTS LANDED AT BOSTON, 1920*

Species	Quantity Pounds	Value
Cod	31,280,506	$1,605,473
Haddock	64,751,888	2,476,828
Hake	2,749,404	97,150
Pollock	3,337,074	122,421
Cusk	745,627	21,110
Halibut	2,512,532	497,765
Mackerel	6,254,020	660,495
Miscellaneous	6,927,851	655,327
Total	118,558,902	$6,136,569

*Statistical Abstract of the United States 1921

The receipts of fish at Boston have increased fifty per cent from the ten year period 1891–1900 to the ten year period 1911–1920. All the

coast cities and towns near Boston are noted for their fishing activities and Boston is recognized as one of the large fishing ports of the world.

The Boston region is near the most productive fishing grounds of North America (Fig. 1). The continental shelf gradually widens until it reaches a maximum width of approximately 400 miles in the Banks of Newfoundland. The shelf is broken by a few places more than 100 fathoms deep such as in the Gulf of St. Lawrence, at the

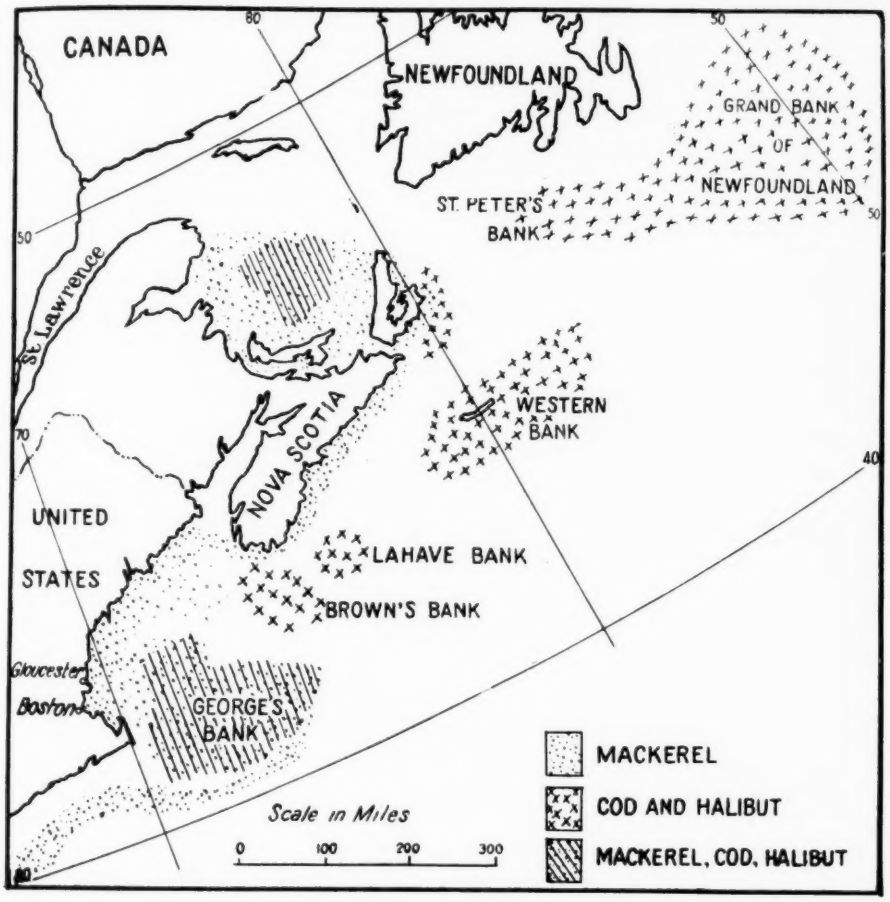


FIG. 1. Sketch map of fishing banks of North America near Boston.

entrance to the Gulf between Newfoundland and Cape Breton Island, and about one-half way between Nova Scotia and Cape Cod.

All along the Atlantic coast on the shallow areas are fishing grounds, but with the exception of the spring mackerel catch, the grounds to the south of Long Island are of little importance to the fishermen of the Boston region. The chief fishing regions tributary to the region

are due chiefly to (1) the wide continental shelf furnishing feeding grounds for such fish as the cod and mackerel and (2) the polar current from the north which washes the shores of Canada and Maine and gradually mixes with the warm waters from the Gulf Stream to the east of New England. More edible and valuable fish are found in cool waters than in warm waters.

The range of the fish varies with the species. Bluefish are wandering fish and sometimes they disappear from a locality for a number of years. The cod and the haddock range from New Jersey to Newfoundland. The cod feeds on the bottom and is usually caught by means of a "trawl." The "trawl" may be a thousand feet long and consists of baited hooks fastened to short lines about four feet apart which in turn are attached to the main line. Men in dories look after the lines. Hake and halibut are also taken by the cod fishermen. Mackerel are found from Cape Hatteras to Newfoundland and are surface swimmers. They are commonly taken in nets and are often caught at night. Lobsters are found from the Delaware Bay to the north of the St. Lawrence River, but due to the unwise prosecution of the lobster industry, a large quantity of the lobsters received at Boston comes from the shores of Nova Scotia. In March, 1921, Boston received 6,331 crates of lobsters by steamer. Clams are abundant from the Chesapeake Bay to Nova Scotia. Small herring or sardines are found from Martha's Vineyard to Newfoundland. On the coast of Maine are located the sardine factories which send much of their products to Boston for distribution.

During the past fifteen or twenty years several changes have taken place in the fishing industry. Many large vessels have given place to smaller ones operated by fewer men. Almost every fishing vessel has gasoline power and even the large sailing schooners usually have gasoline engines to aid the wind. The engines are also used for pulling the nets and dragging the trawls as well as for unloading the fish. The swift motor boat, generally carrying five men or less, enables the fishermen to go out some distance from shore and return with their catch on the same day, thus bringing the fishing grounds nearer to the markets. Recently steam trawlers have been introduced. They have resulted in an increase in the catch of fish.

The fishing business at Boston has changed its principal location several times during the last hundred years. In the early part of the nineteenth century it was conducted mainly on the Charlestown side of the harbor. Later it was moved to Boston proper or to that part of Boston which used to be called peninsular Boston. Due to increased business, the industry had to seek another location. In 1914 it was

moved to the Boston Fish Pier in South Boston, where it is today. The Boston Fish Pier is usually a very active place during the day in the fishing season and vessels may be lined up around the wharf in two or more rows during the busy periods. The pier is 1,200 feet long and 300 feet wide and vessels may unload on three sides. The water is twenty-three feet deep at low tide. The pier contains an Administration Building, wholesale stores and abundant facilities for taking care of the numerous details connected with the fishing industry. It has a fish freezing and cold storage plant with a capacity of 15,000,000 pounds and an ice making capacity of 230 tons a day. Vessels going on a fishing trip obtain their ice at the pier.

Since fish is a perishable product, the expense of marketing is high. The public does not buy fish steadily day after day. Other drawbacks to the fish trade are high transportation rates and the uncertainty of the catch. The market fluctuates according to the amount received each day. The production of fish depends largely upon the habits of the fish, the changes in the temperature of the water, the weather and the waves which influence the operation of boats. Schools of fish may appear or disappear without any apparent reason. The following quotation from *Current Affairs*, October 31, 1921, shows how the price of fish may double in a very short time. "One million pounds of fresh groundfish at the Boston Pier, Monday, October 17 and only slightly over one-tenth of that or about one hundred and twelve thousand pounds on the following Monday of October 24th, is a contrast which would be impossible to forecast. And yet such over-night fluctuations of supply are common occurrences in the fish business and are one of the contributing causes making it one of the most hazardous and speculative lines of trade. Fresh haddock on Saturday, October 22, sold ex-vessel at $2\frac{1}{4}$ cents while the following Monday, the day of light arrivals, it just doubled in price, bringing 5 cents per pound. This particular case of light production was caused by windy weather at sea interfering with operations."

During the forty-one years following 1880, New England fishermen took eleven and one-third million quintals of groundfish from the New England Shore and Georges' Banks in comparison with nine and one-third million quintals from the Grand and Western Banks.

FUTURE OF THE FISH INDUSTRY

The future of the fish industry is promising. Fish as a food can take the place of many of the food animals raised on land. If this is done cheaper food should be furnished. The sea is a great storehouse

for food and there are many varieties of edible fish that the people have not begun to eat in this country. The per capita consumption of fish in the United States is low in comparison with some other countries. For example, the per capita consumption in Japan is said to be about 200 pounds, in the United Kingdom, 65 pounds, in Sweden 52 pounds, in Norway 44 pounds, in Canada 30 pounds and in the United States 16 pounds. Our diet consists of about three per cent fish, seventeen per cent meats and poultry, and eighty per cent other foods. With the increase in population people will turn more and more to the sea for food and Boston, being near the fishing grounds, will always be an important fishing port.

THE UNKNOWN TETONS

GEORGE CLUERG

An effort lately made to extend on the south the boundaries of the Yellowstone Park calls attention to the fact, little realized, that the well known wonders of the Park have a rival nearby whose attractions may fairly be said to exceed all those of the Yellowstone and also the other Western marvels.

The Teton Mountains, which stand on the Wyoming-Idaho line just south of the Park surpass in extreme Alpine grandeur and sharpness of outline anything else in the West, and at least equal, if not excel, the Canadian Rockies and Selkirks.

Probably because of their inaccessibility hitherto, they have by no means gained the vogue they deserve among travelers and others, tho they have for a century or more been known and described in various American writings—Irving's "Astoria" and "Bonneville," Wister's "Virginian," Moran the painter also dealt with them—and they were still earlier familiar to the old French trappers who named them.

Their unique character among the western mountains is shown by the epithets given them by different writers, of "incomparable," "mighty," and "austere."

As shown on map (Fig. 1) the main group consists of the Grand Teton and five other chief peaks, adorned with woods, glaciers and several lakes at the foot of the slopes. The six lofty summits arrange themselves symmetrically when seen as in the sketch, from the east, which is the bolder or front face of the range. There the Jackson-Hole valley, noted for its elk and moose, and formerly for its outlaws,

lies with its settlements, directly in the august presence of the Teton giants.

The left-hand map (Fig. 1) gives a close-up glimpse of the heart of the range. These peaks—in the past sometimes known as the Pilot Knobs or Mt. Hayden—are surrounded by a stormy sea of lesser mountains, as shown on the route map at right, thru which the nearest

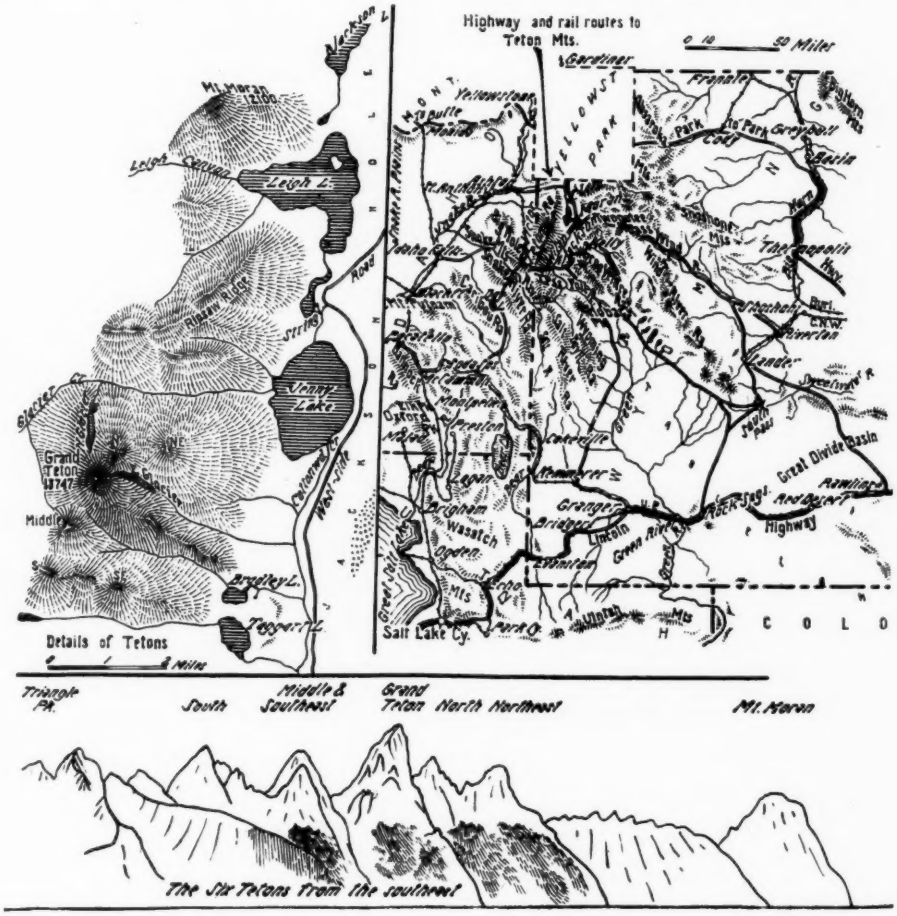


FIG. 1

approach by rail is the Victor, Idaho, branch of the Union Pacific, thence twenty-eight miles by good road to Jackson, chief town of the Jackson Hole country. This is a little roundabout for visitors from points east, from which direction the Twogotee road recently improved with lowered grades, leads direct from Lander and other Central Wyoming points on the Park-to-Park highway and the Burlington

and Chicago & Northwestern railways. Lander can also be reached by road from Rawlins, Wyoming, on the Union Pacific main line and the Lincoln Highway.

Also from these last two arteries, leaving them at Rock Springs and Kemmerer, Wyoming, fair roads lead via Hoback to Jackson Hole, whose

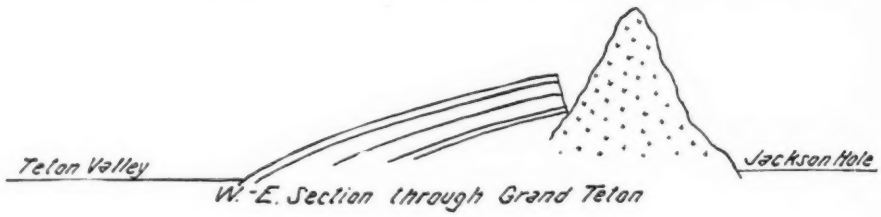
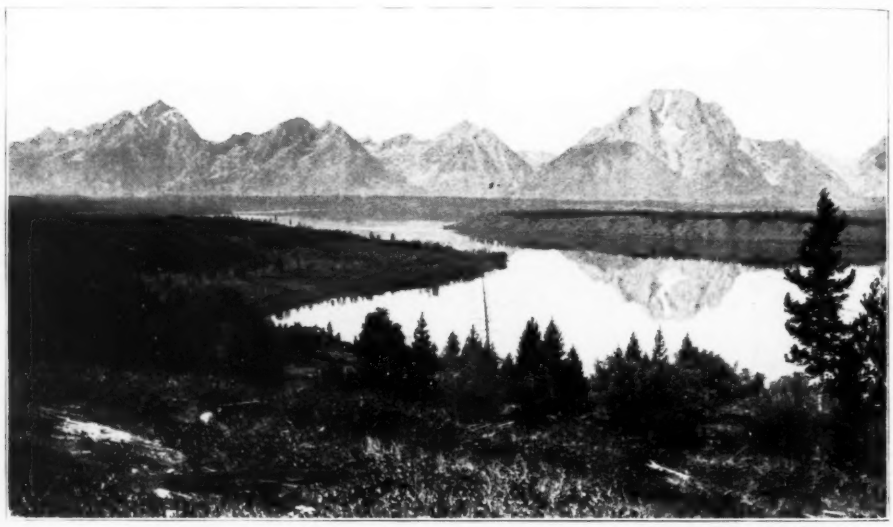


FIG. 2

plain is now—tho from its 6000 foot altitude the season is none too long—largely farmed and in grain fields, whose mild beauty heightens the scene by the contrast with the grim aspect and towering steeps of the valley's tall sentinels. The Grand Teton, sometimes compared in form to the Swiss Matterhorn, is said to have been climbed but once.



Courtesy Union Pacific System

FIG. 3. The massive and rugged eastern side of the Tetons as seen across Jackson Lake

A visit here can be combined with a Yellowstone Park tour by using the south gate-way of the park and thru Moran, from where the peaks, being seen endwise of the range present a many-spired gothic effect; to get the full front view—and it is worth while—at least a short side-trip should be made down the east side road and back on the west of

the valley, the latter road running close under the summits and alongside the lakes.

The west slope (Fig. 2), the gentler or back slope of the range, consists of strata moderately tilted up to the east to the point where they break off in immense precipices overhanging the deep chasm of Glacier Creek. Along the fault-line marked by these great cliffs rests the imposing, steepled mass of crystalline rocks forming the main group of peaks.

The east flowing streams with their steeper drop, have cut well back into the sedimentary materials, whose westward streams tend to be further robbed of the parts of their upper basins undermined by the encroaching canyons from the east side. Thus it comes about that this spectacular mountain chain, which does *not* lie on the continental divide, moreover does not even have its own water-parting along the line of its chief heights. The same cause gives rise to the deeply-notched appearance of the range when seen from the east.

To the pinnacles are too steep for much snow to lodge, lower down there is a large display of glacial operations, in the morainal lakes, cataracts, the ice-streams themselves and the big moraine "dumps."

From Victor and other points in that valley at the west base, now bearing the same name as the range itself, from thruout that valley also and far over the Snake River plains of eastern Idaho, the erect and impressive figures of the Tetons loom gravely in the distance, the unrivalled landmarks of the region.

SUMMER COURSES IN GEOGRAPHY

The following educational institutions sent data of summer school work in geography.

Northern Arizona Normal School, Flagstaff, Ariz.

Methods in Geography. Vernon Lantis

Commercial Geography. Vernon Lantis

Field work includes trips to, Oak Creek Canyon, Grand Canyon of the Colorado, Sunset Mountain and the Painted Desert, Lava Beds, San Francisco Crater, Meteor Mountain, Walnut Canyon and the Cliff Dwellings.

University of California, Berkeley, Calif. June 23 to Aug. 2, 1924.

Introduction to Geography: Natural Regions and the Distribution of Man and of Cultures. Dr. C. O. Sauer

Commercial Geography: Primary Production. Dr. C. O. Sauer

University of Colorado, Boulder, Colo.

General Geology. Professor McCourt and Associate Professor Worcester

Field Geology. Mr. Sperry and Associate Professor Worcester

Historical Geology. Mr. Sperry

Minerals and Rocks. Mr. Sperry
Problems in Rocky Mountain Geology. Professor McCourt
Advanced Physiography. Associate Professor Worcester
Climatology. Associate Professor Worcester
Geographic Influences. Professor McCourt
Geography of Commercial Commodities. Assistant Professor Newman
Geography of Trade. Assistant Professor Newman
Geography of Western North America. Assistant Professor Newman
Geography of Eastern North America. Assistant Professor Newman
Geography of Middle North America. Assistant Professor Newman
Geography of Asia. Assistant Professor Newman
Field Courses at the Mountain Laboratory. Professor McCourt and Mr. Sperry

Headquarters are at Science Lodge adjoining the University Camp near the continental divide, and about twenty-five miles from Boulder. The cost is $130.00, including all expenses. Students desiring to register should consult with Professor W. E. McCourt by mail or in person before July 12 (address Washington University, St. Louis, Missouri, until June 13, after that date, University of Colorado, Boulder, Colorado). Courses are offered to three types of students: beginners, advanced, and graduate. The last week is devoted to a trip thru the Rocky Mountain National Park.

George Washington University, Washington, D. C.
General Geography. Assistant Professor Chas. E. Resser
(Credited toward junior high school requirements)

Lewiston State Normal School, Lewiston, Idaho
Geography Methods. Professor Ernest E. Holmes
Geography for Primary Teachers. Professor Ernest E. Holmes
Principles of Geography. Professor Ernest E. Holmes

University of Chicago, Chicago, Ill.
The Elements of Geography. Associate Professor Jones
Economic Geography. Associate Professor Jones
Field Course in the Green Bay Region (First Term). Assistant Professor Platt
Geography of Caribbean America. Assistant Professor Platt
Historical Geography of the United States. Professor Barrows
Conservation of Natural Resources. Professor Barrows
Geography of Soils. Assistant Professor Senstius
Geography of Australasia. Assistant Professor Senstius
Geography of Western Europe. Mr. Young (London, England)
The Expansion of the British Empire. Mr. Young
Graphics and Cartography. Professor Goode
History of Geography. Professor Goode
Field Geography (semi-independent work). Associate Professor Colby
Dissertations in Geography. Professor Barrows
The Technique of Teaching Elementary Geography. Miss Parker
The Teaching of Geography in Secondary Schools. Mr. Leppard
Organizing Geographical Material for Elementary Schools. Miss Parker
Modern Tendencies in the Teaching of Geography in England. Mr. Young
Investigations of Problems in the Teaching of Geography. Miss Parker

Northwestern University, Evanston, Ill.
Physiography and Geology. Mr. Stark and Miss Erb
Human Geography. Professor Haas
Field Course in Glacier National Park. Miss Fuller
Geography of South America. Professor Haas
Field Course in the Lake Superior Region. Professor Grant

Open to men who have completed at least a year's course in geology, but more work than this will be an advantage. The course will begin about August 4 to August 11 and will last four weeks. A detailed report will be required. Advanced students may obtain additional credit and may secure material for Masters' theses. Tuition for all students $50; for those who are not already matriculated in Northwestern University there will be the regular matriculation fee of $5. For further information address Professor U. S. Grant, University Hall, Evanston, Illinois.

Chicago Normal College, Chicago, Ill.

The Teaching of Geography in the Elementary Grades. Dr. Frederick K. Branom
The Teaching of Geography in the Junior High School. Dr. Frederick K. Branom
Industrial and Commercial Geography. Mr. Ira N. Van Hise and Miss Alyda C. Hanson
Geography of North America. Mr. Ira N. Van Hise
Geography of South America. Miss Alyda C. Hanson
Geography of Asia. Miss Alyda C. Hanson

Northern Illinois State Teachers College, DeKalb, Ill.

First Term (June 9–July 18)
Geography for Rural Teachers. Mr. Gould
Geographical Influences on American History, Mr. Gould
Elements of Geography. (Two sections) Mr. Carlson
Second Term (July 21–Aug. 29)
Elements of Geography. Mr. Carlson
Regional Geography. Mr. Carlson

Illinois State Normal University, Normal, Ill.

First Term (June 9–July 18)
Physical Geography. Miss Esther L. Knapp
Principles of Geography. Mr. Guy A. Buzzard
*Lower Grade Methods (Two sections). Miss Eulalia Tortat
*Upper Grade Methods (Two sections). Professor Robert G. Buzzard
Geography of South America. Mr. Guy A. Buzzard
Commercial Geography. Professor Harry O. Lathrop
Geographic Influences in United States History. Professor Robert G. Buzzard
Political Geography. Professor Harry O. Lathrop
Methods in High School Geography. Miss Eulalia Tortat
Advanced Physiography. Miss Esther L. Knapp
Second Term (July 21–August 27)
Principles of Geography. Miss Ruth McDill
*Lower Grade Methods. Miss Ruth McDill
*Upper Grade Methods. Miss Ruth McDill
Commercial Geography. Professor Harry O. Lathrop
Geography of Europe. Mr. George F. Howe
Geographic Influences in United States History. Professor Harry O. Lathrop
Climatology. Mr. George F. Howe

*Thirty lessons each. All other courses are sixty lessons each, classes meeting twice each day.

Indiana University, Bloomington, Ind.

Economic Geography (Double course). Assistant Professor J. E. Switzer
Geography of Europe. Assistant Professor J. E. Switzer
Physiography (Double course). Instructor Archie Addington
Map interpretation. Instructor Archie Addington
Advanced Field Work, Indiana Geological Survey. Professor W. N. Logan

Indiana State Normal School, Eastern Division, Muncie, Ind.
Principles of Geography. W. C. Goble
Home Geography. W. C. Goble and Miss Lora Baker
Physiography. Miss Lora Baker
Economic Geography. Miss Lora Baker
Geography of the United States. Frederick J. Breeze
Geography of Soils. Frederick J. Breeze
Teaching of Elementary Geography. W. C. Goble
Geography. Eastern Field Trip. Frederick J. Breeze
Physiography. Eastern Field Trip. Frederick J. Breeze
The field work in physiography and geography will be done in the regions traversed by the Erie Canal, Lake Seneca and Cayuga, Champlain Canal into Canada, and Hudson River to New York City. Travel will be by means of houseboats. Side trips will be made to Niagara Falls, Lake Ontario, Adirondack Mountains, Green Mountains, Lake George, and the Catskills. July 19 to Aug. 23.

Western Kentucky State Teachers College, Bowling Green, Ky.
Principles of Geography. Mr. Carpenter
Teachers Geogaphy. Miss Jeffries and Mr. Carpenter
Geography of Kentucky. Miss Jeffries
Geography of Asia. Miss Jeffries

Maryland State Normal School, Towson, Md.
Principles of Geography. E. Curt Walther
Geography in the Lower Grades. E. Curt Walther
Geography in the Upper Grades. E. Curt Walther

Clark University, Worcester, Mass.
Elementary Geography and Climatology. Messrs. Atwood and Brooks
Economic and Commercial Geography. Mr. Case
Geographic Influences in the History of the United States. Mr. Case
Geography in Education for Special Teachers. Mr. Ridgley
Physiographic Regions and Climatology of North America. Messrs. Atwood and Brooks
Economic Geography of North America. Mr. Case
Geography of the British Isles and of Continental Europe. Mr. Barker
Special Tropical Africa. Mr. Barker
The Teaching of Geography in the Elementary School. Mr. Ridgley
Introduction to General Geology. Mr. Peattie
Seminar in Geography. Messrs. Atwood and Brooks
Research in Regional Geography. Mr. Atwood
Research in Climatology. Mr. Brooks

State Teachers College, Bemidji, Minn.
Geography Methods. Professor Schofield
North America or Europe. Professor Schofield
Physical Geography.
Commercial Geography.

State Teachers College, Mankato, Minn.
Elements of Geography. (Two sections) Miss Sletten and Miss Anderson
Geography of North America. Mr. Miller
Technique of Geography Teaching. Mr. Miller

State Teachers College, Warrensburg, Mo.
Geography of North America. Dr. H. A. Phillips
Physical Geology. Dr. H. A. Phillips
Conservation of the Natural Resources. Dr. H. A. Phillips
Methods in Geography. Lillie Shock

Southwest Missouri State Teachers College, Springfield, Mo.

Principles of Geography. Miss Moina Prator
Physiography. Miss Prator
Industrial and Commercial Geography. Miss Prator
The Geography of Europe. Miss Prator
The Geography of North America. Miss Prator
The Teaching of Geography. Miss Prator
Field Course in Geography. Miss Prator

In August a class will visit Oregon, Washington, and southeastern Alaska, studying irrigation farming, the lumber industry, fishing, gold mining, the manufacturing and commerce of Seattle and Portland, and the great scenic features of the Northwest. Lectures on the historical geography of the Northwest are given. Credit is dependent upon the work done. Further information may be obtained from the instructor.

State Teachers College, Maryville, Mo.

Elements of Geography. A. J. Cauffield
Economic Geography. A. J. Cauffield
Physical Geography. M. M. Pigg
Industrial Geography. Fannie Hope
Geography Methods. Fannie Hope
Erosion, Rocks, and Maps. A. J. Cauffield
Human Geography. A. J. Cauffield

University of Missouri, Columbia, Mo.

The Geography of North America. P. E. Andrew
Geographical Influences in American History. P. E. Andrew
Method and Content in Geography. P. E. Andrew
a. For Elementary Schools
b. For High Schools

University of Nebraska, Lincoln, Nebraska

First Term (June 9–July 16)

Principles of Geography. Professor Bengtson
Economic Geography of Agricultural Industries. Miss Anderson
Field Geography, Lincoln and Lower Platte Valley. Miss Anderson
Geography of Nebraska. Miss Anderson
Geography of Latin America. Professor Bengtson
Methods in High School Geography. Professor Bengtson
Graduate Seminar. Professor Bengtson and Miss Anderson

Second Term (July 16–August 22)

Principles of Geography. Professor Rose B. Clark
Geography of the United States. Professor Bengtson
Field Geography. Professor Bengtson
Geography of Nebraska. Professor Clark
Geography of European Countries. Professor Bengtson
Methods in Teaching Geography. Professor Clark
Graduate Seminar. Professor Bengtson

State University of New Mexico, Albuquerque, N. Mex.

Teachers Course in Geography. Professor R. W. Ellis
Geography of North America. Professor R. W. Ellis

Columbia University, New York, N. Y.

Economic Geography. Dr. John E. Orchard
Physical Geography and its Economic Aspects. Dr. Frank J. Wright
Geography of Europe. Dr. Armin K. Lobeck
Geography of North America. Dr. Frank J. Wright

Geographic Delineation and Map Interpretation. Dr. Armin K. Lobeck
Mathematical Geography. Dr. Frederick Slocum
The Essentials of Geography. DeForest Stull
Teaching of Geography in the Lower Grades. DeForest Stull
Teaching of Geography in the Upper Grades. DeForest Stull
Field Work in Physiography (New York, New Jersey and Pennsylvania Region). June 20—July 3, Dr. Armin K. Lobeck
Field Work in Physiography (Eastern Region) Aug. 16-27. Dr. Armin K. Lobeck
Field Work in Physiography (Southern Region) Aug. 16-28, Dr. Frank J. Wright

Cornell University, Ithaca, N. Y.

Physical Geography. Professor O. D. von Engeln
Commercial Geography. Professor O. D. von Engeln
Regional Geography of Europe. Professor R. M. Brown
Geography and Human Culture, Lands and Peoples. Professor R. M. Brown
Geology. Associate Professor V. E. Monnett
Mineral Resources. Associate Professor V. E. Monnett
Geography of New York State. Professor A. W. Abrams
Physical Geography Laboratory Course. Professor H. M. Leighton, Miss Brotherhood and Miss Mattson
Geology Laboratory. Professor H. M. Leighton, Miss Brotherhood and Miss Mattson
Geography and Geology Field Course. Professor H. M. Leighton, Miss Brotherhood, Miss Mattson and other members of department cooperating.

This course consists of five afternoon trips, two all day trips and one two day trip to Niagara Falls. The region about Cornell University is especially rich in phenomena of physiographic and geologic interest and scenically very attractive, waterfalls, gorges, high summits, broad prospects abound and are encountered immediately on the campus boundaries. The University is in the center of the Finger Lakes District of central New York.

Oswego State Normal School, Oswego, N. Y.

Methods for Intermediate Grades. Caroline V. Sinnamon
Methods for Junior High School Grades. Caroline V. Sinnamon

Oberlin College, Oberlin, Ohio

Field Geology Course. Profesor George D. Hubbard

Opening June 18 and Closing Aug. 7; Credit, including report, eight semester hours. Prerequisite: General Geology or equivalent. Open to both men and women. Region selected is virgin ground in southern Vermont with a fine series of metamorphosed ancient sediments, intruded igneous rocks, and quantities of glacial drift. Stream problems both before and after glaciation. One day going spent at Niagara Falls. Work consists of careful study of geology and physiography, physiographic, geologic and topographic mapping, and a thoro interpretation of the geologic record. Report prepared after return. Expenses aside from transportation about $115.00. Apply early.

Ohio University, Athens, Ohio

Geography and Method for Upper Grades. Professor C. E. Cooper
Geography and Method for Lower Grades. Assistant Professor A. LaFleur
Geography and Environment. Professor C. E. Cooper
Geographical Influences in American History. Assistant Professor A. La Fleur
Conservation of Natural Resources. Professor C. E. Cooper

Kent State Normal School, Kent, Ohio

Principles of Geography. Miss Pettis
Geography in Upper Grades. Miss Pettis
Principles of Geography. Miss Robertson
Teachers Course in Geography. Miss Robertson
North America, Regional Geography. Professor Olson

Geography in the Lower Grades. Professor Olson
Geographic Influences in History. Professor Olson

Cleveland School of Education and Western Reserve University, Cleveland, Ohio
The Curriculum in Elementary School Geography. Esther Matchett
The Principles of Geography. Esther Matchett
Regional Geography of the United States. Esther Matchett
Commercial and Industrial Geography. W. M. Gregory
Geographical Influences in American History. W. M. Gregory
Field Course in Industrial Geography. W. M. Gregory and assistants
Twenty-four field trips for the intensive study of major industries.
Research in geographical influences in industries.

University of Oklahoma, Norman, Okla.
General and Regional Geography. Assistant Professor C. J. Bolinger
Agricultural Geography. Assistant Professor C. J. Bollinger
Geology 1. General Geology. Mr. Tharp
Geology 2. Historical Geology. Mr. Tharp
Field Course to Arbuckle Mountains. Associate Professor C. E. Decker

University of South Carolina, Columbia, S. C.
Methods in Geography. Miss Sadie Goggans
Human Geography. Miss Sadie Goggans

George Peabody College for Teachers, Nashville, Tenn.
Principles of Human Geography. Miss Cowling
Geography of the Lands. Mr. Brown
Climate and Man. Dr. Parkins
Economic Geography of United States. Miss Cavert
Geography for the Early Elementary Grades. Miss Cavert
Geography of North America. Miss Cowling
Geography of Europe. Mr. Brown
Geography of Latin America. Miss Cavert
Geography of World Problems. Dr. Parkins
Conservation of Natural Resources. Mr. Brown
Influences of Geography on American History. Miss Cowling
Problems and Projects in Geography Teaching. Dr. Parkins
Seminar in Geography. Dr. Parkins

East Texas State Teachers College, Commerce, Texas
Principles of Commerce and Industry. T. Taylor Broun
Geography of Texas. T. Taylor Broun
North America (Regional). T. Taylor Broun
Teaching of Geography. T. Taylor Broun
Influence of Geography on American History. T. Taylor Broun

Sam Houston State Teachers College, Huntsville, Texas
College Courses
Elements of Geography. Miss Harriet Smith
Geography of Texas. Miss Harriet Smith
Teaching of Geography. Miss Harriet Smith
Business Geography. Miss Esther S. Anderson
Geography of North America. Miss Esther S. Anderson
Elements of Geology. Miss Esther S. Anderson
Sub-College Courses
Natural Regions of the Continents. Miss Allena Brashear
Commerce and Industry. Miss Allena Brashear
Principles of Human Geography. Miss Allena Brashear

Southern Methodist University, Dallas, Texas
Principles of Geography. Dr. Shuler and Mr. Foscue
Physiography of the United States. Dr. Shuler
Geography of North America. Mr. Foscue

West Texas State Teachers College, Canyon Texas
Principles of Human Geography. Associate Professor Walker
Commercial and Industrial Geography. Associate Professor Walker
Advanced Physiography. Associate Professor Walker
Geography of Texas. Associate Professor Walker
The Teaching of Geography in the Grades. Associate Professor Walker

University of Washington, Seattle, Wash.
Modern Geography. E. J. Saunders
Climatology. E. J. Saunders
Physiography of the United States. E. J. Saunders
Two week end trips to glaciers on Mt. Rainier. One each term.

Milwaukee State Normal School, Milwaukee, Wisconsin
Geography of Wisconsin. Professor Louise W. Mears
The Teaching of Geography. Professor Louise W. Mears
General Geography. Harvey A. Uber
Physical Geography. Harvey A. Uber

State Normal School, Whitewater, Wis.
Principles of Geography and Methods. M. Calvert
Commercial Geography. W. C. Fischer
Overseas Commerce. W. C. Fischer
Rocky Mountain Field Course.

At the close of the 1924 summer session, the Whitewater State Normal School offers a field trip in the Southern Rockies. The trip starts July 26 at 11 P. M. from Chicago and closes about August 15. The trip covers 4300 miles and is estimated to cost $190 round trip. Written report for credit. For further information, write W. C. Fischer, State Normal School, Whitewater, Wisconsin.